

1-1-2017

# Exploring smoking, mental health and smoking-related disease in a nationally representative sample of older adults in Ireland – A retrospective secondary analysis.

Annette Burns
*Royal College of Surgeons in Ireland*, annetteburns@rcsi.ie

Judith Strawbridge
*Royal College of Surgeons in Ireland*, jstrawbridge@rcsi.ie

Luke Clancy
*Dublin Institute of Technology*

Frank Doyle
*Royal College of Surgeons in Ireland*, fdoyle4@rcsi.ie

## Citation

Burns A, Strawbridge JD, Clancy L, Doyle F. Exploring smoking, mental health and smoking-related disease in a nationally representative sample of older adults in Ireland – A retrospective secondary analysis. Journal of Psychosomatic Research. 2017;98:78-86.



# Exploring smoking, mental health and smoking-related disease in a nationally representative sample of older adults in Ireland – a retrospective secondary analysis

Annette Burns MSc[1]

Judith D Strawbridge PhD[2]

Luke Clancy PhD[3]

Frank Doyle PhD[1]

[1]Department of Psychology, Royal College of Surgeons in Ireland

[2]School of Pharmacy, Royal College of Surgeons in Ireland

[3]TobaccoFree Research Institute, DIT Kevin Street, Dublin 8

Corresponding author:

Annette Burns

Department of Psychology, Beaux Lane House, Mercer Street Lwr, Royal College of Surgeons in Ireland, Dublin 2.

Phone: 01 4028622

Fax: 01 4022764

## Abstract

**Objective:** Smoking is the leading preventable cause of death among individuals with mental health difficulties (MHD). The aim of the current study was to determine the impact of smoking on the physical health of older adults with MHD in Ireland and to explore the extent to which smoking mediated or moderated associations between MHD and smoking-related diseases.

**Methods:** Cross-sectional analysis of a nationally representative sample of 8,175 community-dwelling adults aged 50 and over from The Irish Longitudinal Study on Ageing (TILDA) was undertaken. Multivariate adjusted logistic regression models were used to assess the association between MHD, smoking (current/past/never) and smoking-related diseases (respiratory disease, cardiovascular disease, smoking-related cancers). A number of variables were employed to identify individuals with MHD, including prescribed medication**,** self-reported diagnoses and self-report scales.

**Results:** MHD was associated with current (RRRs ranging from 1.84 [1.50 to 2.26] to 4.31 [2.47 to 7.53]) and former (RRRs ranging from 1.26 [1.05 to 1.52] to 1.99 [1.19 to 3.33]) smoking and also associated with the presence of smoking-related disease (ORs ranging from 1.24 [1.01 to 1.51] to 1.62 [1.00 to 2.62]). Smoking did not mediate and rarely moderated associations between MHD and smoking-related disease.

**Conclusions:** Older adults in Ireland with MHD are more likely to smoke than those without such difficulties. They also experience higher rates of smoking-related disease, although smoking had no mediating and no consistent moderating role in these analyses. Findings underscore the need for attention to the physical health of those with MHD including support in smoking cessation.

**Key words:** Smoking, Mental Health **Disorders**, Smoking-related Disease, Older adults, Ireland

## Highlights

- Secondary analysis of a nationally representative sample of older adults in Ireland.
- Examined associations between mental health difficulties (MHD) and smoking and between MHD and smoking-related disease.
- MHD was associated with both smoking and smoking-related disease.
- Smoking did not mediate or consistently moderate associations between MHD and smoking-related disease.
- Need for attention to the physical health of those with MHD including intensive smoking cessation support.

# Introduction

## Background

General population smoking prevalence has reached an all-time low of 19% in the UK and 19.5% in Ireland [1,2]. Mental health difficulties (MHD) as identified via various indicators including diagnostic or clinical interview, medical records, current psychiatric treatment, reported doctor diagnosed conditions or medication use, are consistently associated with higher smoking prevalences with rates cited ranging from 25.5 to 59% [3-9]. These increased smoking rates are most pronounced in those with substance use disorders and more severe mental illness (SMI) diagnoses such as bipolar **disorder**, schizophrenia or psychosis [6,7,10-13]. In general, those with MHD tend to smoke more heavily than other smokers [7] and also appear to be less likely to quit smoking [7]. While those with schizophrenia appear to be less likely to quit smoking[14], common mental illnesses such as anxiety or depression also seem to affect quitting behaviour[15]. **For instance, meta-analyses have shown that in patients with chronic respiratory conditions or coronary heart disease patients with depressive symptoms are less likely to quit smoking than those without such depressive symptoms[16,17].**

This higher prevalence of smoking has been associated with significant health consequences in those with MHD. People with mental health conditions die on average 10 to 20 years younger than the general population [18-22] and smoking has been reported as the largest contributor to this premature mortality [23,24]. In the US, Callaghan et al. found significantly heightened patterns of tobacco-related mortality in terms of respiratory disease, smoking-related cancers and cardiovascular disease in patients with schizophrenia (standardised mortality ratio [SMR] 2.45 95%CI 2.41-2.48), bipolar disorder (SMR 1.57 95%CI 1.53-1.62) and depression (SMR 1.95 95%CI 1.93-1.98) [25]. Earlier studies have also shown increased risk of death from cardiovascular disease [4,22,26,27] and cancer [22,26]. Morbidity studies have also shown those with SMI have a significantly higher prevalence of pulmonary illness [3,28-33], cancer [28] and cardiovascular diseases (including stroke, congestive heart failure, angina and myocardial infarction) [28-30] compared to matched samples or general population counterparts [28-32]. While smoking is thought to account for the majority of morbidity and mortality in these populations, studies have **also** found associations between mental illness and respiratory disease, cardiovascular disease and risk of death from cardiovascular disease which seems to persist after adjustment for smoking [4,28,34]. However, the literature is limited by the range of conditions investigated, and the samples used are not always generalisable. For example, many of these studies focus on schizophrenia-related disorders and psychosis, though some have also included affective disorder diagnoses [28,32]. Partti et al.'s study of respiratory disease was population-based but only explored psychosis [3], while other studies were based on clinical populations with some reliant on small samples ranging from 80-100 [28,30,32]. The last study to address the impact of smoking on the physical health of those with MHD in Ireland is now over 30 years old, was specific to schizophrenia and was not population-based [35]. More generally, morbidity and mortality studies have tended to rely upon one or two indicators, **such as structured clinical interviews, medical records, medical service claims or scale scores, but never more than two indicators when** identifying those with MHD [3,4,25,27,29,34]. The use of a number of different methods is preferable to enhance the reliability of the findings.

In addition, chronic diseases such as cardiovascular disease and cancers usually occur later in life. Most cancer diagnoses occur in individuals older than 65 years [36] and CHD risk increases in both men and women after age 55 [37]. In spite of this, some studies of smoking prevalence in those with MHD

have been limited to younger samples with age ceilings of 54 and 64 [7,10] and there are almost no studies of smoking or smoking-related morbidity or mortality specific to older populations. To our knowledge only one study exploring excess mortality in those with MHD concerns those aged 65 and older [27]. The impact of smoking on the physical health of older adults with MHD therefore remains unclear.

In summary, few population studies have explored smoking-related morbidity in older individuals with MHD and there are no recent studies addressing the health impacts of smoking in those with MHD in Ireland. This study had two aims. Firstly, to determine whether there is a higher prevalence of smoking and of smoking-related disease in older adults with mental health problems. Secondly, to assess whether smoking mediates or moderates the relationship between mental health difficulties and smoking-related disease at a population level. Given the absence of diagnostic interviews, several indicators were used both individually and in combination to reliably identify those with MHD. We hypothesized that persons with MHD would be more likely to have higher levels of smoking-related diseases, which would be explained by a higher rate of smoking.

## Methods

### The Irish Longitudinal Study on Ageing (TILDA)

TILDA provides a stratified clustered nationally representative sample of community dwelling adults aged 50 and over living in Ireland [38]. Private residential dwellings were assigned to clusters stratified by geography and socioeconomic group to produce a population representative sample. Across households where it was possible to make contact to confirm eligibility a response rate of 62% was achieved [39]. Population weighting was employed to counteract bias introduced by differential nonresponse [39]. The main sample was compared to Quarterly National Household Survey respondents on age, sex and educational attainment and consequent weights assigned [38]. A more detailed description of the study sample and response rates has been described elsewhere [40]. The current analysis involves the first wave which was collected between 2009 and 2011. Data collection involved an extensive face-to- face computer assisted home interview, a self-completion questionnaire for data deemed more sensitive and a health assessment. Health assessments were conducted at TILDA Assessment Centres in Dublin and Cork, or for those not willing to travel to TILDA Assessment Centres a shorter assessment carried out in their home by a qualified, trained nurse was offered. At wave one 5,894 (72.1%) of the 8,175 participants aged 50 and over completed a health assessment. All variables included in the current analysis were collected at both health centre and home assessments.

### Outcomes

***Smoking status:*** Self-reported current smoking status.

Those who reported ever smoking 'cigarettes, cigars, cigarillos or a pipe daily for a period of at least one year' and answered 'Yes' when asked if they smoked at the present time (including if smoked in past 3 months) were categorised as current smokers. In the initial part of this paper **lifetime** smoking prevalence (current/former/never) is the outcome**, later it** was explored as a potential mediator/effect modifier (to achieve the second aim). Smoking status data was available for 8,174 respondents due to the refusal of one participant to answer this question.

***Smoking-related disease:*** The presence of any one or more **self-reported doctor diagnosed** smoking-related diseases i.e. respiratory disease, cardiovascular disease **or** smoking-related cancers.

For the purposes of this analysis smoking-related cancer was defined as answering 'Yes' when asked if they were ever told by a doctor that they had cancer in any of the following sites: lung; colon or

rectum; stomach; oesophagus; bladder; liver; cervix; kidney; pancreas; oral cavity; larynx; other pharynx (including nasopharynx, oropharynx, laryngopharynx or hypopharynx). These sites were identified based on the 2014 Surgeon General's report [41]. Cancer of the lip, the renal pelvis and acute myeloid leukaemia were not included as these were not specified in the TILDA study.

Respiratory disease was defined as answering 'Yes' when asked if they were ever told by a doctor that they had **'**chronic lung disease such as chronic bronchitis or emphysema**'**.

Cardiovascular disease was defined as answering 'Yes' when asked if they were ever told by a doctor that they had 'angina', 'a heart attack (including myocardial infarction or coronary thrombosis)', 'congestive heart failure', 'high cholesterol', 'a stroke (cerebral vascular disease)' or 'Ministroke or TIA'.

Due to low numbers in two categories (respiratory disease (n=330); smoking-related cancers (n=135)) all three disease groups were combined to indicate having a chronic smoking-related disease (score=1) or not (score=0) for the purposes of this analysis.

## Exposure variables

MHD: A number of variables were taken as indicators of evidence of MHD and used individually and in combination to model the association between MHD and smoking and between MHD and smoking-related disease.

An emotional, nervous or psychiatric problem was defined as answering 'Yes' when asked if they were ever told by a doctor that they had **'**any emotional, nervous or psychiatric problems, such as depression or anxiety**'**.

Alcohol or substance abuse was defined as answering 'Yes' when asked if they were ever told by a doctor that they had an **'**alcohol or substance abuse**'** condition.

Psychiatric medication use: Participants were asked to bring medications to interviewer during **the** face-to-face home interview and all anxiolytics, antipsychotics and anti-depressants were included (ATC codes: N05B; N05A; N06A). Any participant who was taking one of these medications was considered to have MHD.

Psychometric scales:

CES-D: The Center for Epidemiologic Studies Depression Scale (CES-D) is a 20-item self-report depression scale designed for epidemiological studies of depression [42]. Each item is measured on a 4-point Likert scale reflecting frequency of occurrence. **A** cutoff score of ≥ 16 is said to indicate clinically significant or severe depressive symptoms **while a score of 8-15 is defined as moderate depressive symptoms [43-45]**. This measure was administered during the face-to-face computer assisted home interview [39] and 8,044 (98.4%) responded to all 20-items.

HADS-A: The HADS-A is the 7-item anxiety subscale of the Hospital Anxiety and Depression Scale [46]. This self-report measure with a four option Likert-type response format was included in the self-completion questionnaire and returned by 6,637 of the 8,175 (81.2%) TILDA participants aged 50 and over. Zigmond and Snaith recommended cutoffs of >8 and >11 to detect possible and probable anxiety caseness [46].

For categorical scale variables, the 'probable anxiety' and 'severe depressive symptoms' categories were assessed as indicators of MHD.

### Covariates

We adjusted for demographic variables (age, sex, education and marital status) when modelling smoking status. In modelling smoking-related disease other known confounders (physical activity, waist circumference, alcohol use and diabetes (self-reported doctor diagnosed)) were also included. Age and waist circumference were continuous, while all other covariates were ordinal/categorical. Physical activity was assessed using the short form 8-item version of The International Physical Activity Questionnaire (IPAQ) [47], which estimates time spent performing physical activities (moderate to vigorous) as well as inactivity (time spent sitting) [48]. Alcohol problems were identified using the CAGE questionnaire, a widely used and extensively validated screening tool for alcoholism, which was included in the self-completion questionnaire. A CAGE test score of 2 or more is said to identify problem drinkers [48,49]. Waist circumference was measured at the health assessment during wave one and so was only available for participants completing that component.

### Statistical analyses

Key variables and demographic characteristics of the sample were compared according to smoking status using analysis of variance models and chi-square statistics as appropriate.

Multinomial regression analysis was performed to investigate the association between MHD and smoking. The models were weighted and adjusted for age, sex, education and marital status as these were all significantly associated with the outcome smoking status. The *margins* command in Stata provided adjusted prevalence estimates.

Multivariate logistic regression models were **then** employed to explore the association between MHD and smoking-related disease. These models were weighted and adjusted for potential confounders including socio-demographic characteristics (age, sex, education) and additional known risk factors (physical activity, waist circumference, alcohol use and diabetes (self-reported doctor diagnosed)). These covariates were identified based on the literature.

Baron and Kenny's four step approach was employed to test for mediation [50]. Firstly, as above, we tested to see if the independent variable, MHD, predicted the dependent variable smoking-related disease. Secondly, and also already encompassed in aim one, we tested to see if MHD predicted smoking. Thirdly, it was assessed whether the mediator, smoking status, predicted smoking-related disease even while adjusting for MHD. Finally, smoking status was added to models predicting smoking-related disease and changes in the association between MHD and smoking-related disease were observed for mediation effects.

Then, to test for any moderating role of smoking, interaction terms were also built and added to models.

Data analysis was performed using Stata 13.0 [51].

## Results

### Sample Description

This analysis of TILDA included 8,175 participants aged 50 years and over. As described above, due to missing values related to issues such as health assessment attendance and completion of the HADS-A the analytic sample ranged from 5,024 to 8,158. Sample sizes for each model are included below (Tables 2-4).

Overall 18.24% of respondents were current smokers and 38.1% were former smokers. The prevalence of MHD ranged from 1.60% (self-reported alcohol or substance use problem) to 9.49% (severe depressive symptoms as per CES-D) based on the various indicator variables. Almost half of respondents (45.9%) had at least one smoking-related disease at baseline. Cardiovascular disease

was most prevalent (43.1%), followed by respiratory diseases (4.04%) and finally smoking-related cancers (1.65%).

Table 1 illustrates the main characteristics of the sample broken down by current smoking status. Age, sex, education and marital status were all significantly related to current smoking status. Current smokers were younger and more women had never smoked. Overall just 17.3% of those with a smoking-related disease were current smokers. Over half of those reporting a diagnosed smoking-related cancer were former smokers and almost a third of those reporting diagnosed respiratory conditions were current smokers.

**Table 1**
**Demographics, physical and mental health and health behaviour characteristics of TILDA cohort (8,174)**

| | **Current smoker (n=1,491)** **18.2%** | | **Former smoker (n=3,117)** **38.1%** | | **Never smoker (n=3,566)** **43.6%** | | | |
|---|---|---|---|---|---|---|---|---|
| ***Continuous*** | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *F* | *p Value* |
| Age | 61.3 | 8.87 | 64.9 | 9.82 | 64.0 | 9.93 | 69.7 | <.001** |
| ***Categorical*** | *N* | *%* | *N* | *%* | *N* | *%* | $\chi^2$ | *p Value* |
| Women | 811 | 18.3% | 1,387 | 31.3% | 2,233 | 50.4% | 220.0 | <.001** |
| Men | 680 | 18.2% | 1,730 | 46.2% | 1,333 | 35.6% | | |
| **Education** | | | | | | | | |
| *Primary/None* | 571 | 22.8% | 990 | 39.5% | 942 | 37.6% | 113.2 | <.001** |
| *Secondary* | 619 | 19.0% | 1,165 | 35.7% | 1,479 | 45.3% | | |
| *Third/Higher* | 300 | 12.5% | 960 | 39.9% | 1,144 | 47.6% | | |
| **Marital status** | | | | | | | | |
| *Married* | 920 | 16.3% | 2,179 | 38.7% | 2,538 | 45.0% | 110.8 | <.001** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Never married* | 162 | 20.5% | 311 | 39.3% | 318 | 40.2% | | |
| *Separated/Divorced* | 186 | 33.8% | 186 | 33.8% | 179 | 32.5% | | |
| *Widowed* | 223 | 18.7% | 441 | 36.9% | 531 | 44.4% | | |
| **MHD indicator variables (Exposure variables)** | | | | | | | | |
| Emotional, nervous or psychiatric problem (self-reported doctor diagnosed) ***Lifetime prevalence*** | 190 | 27.4% | 254 | 36.6% | 249 | 35.9% | 45.7 | <.001** |
| Self-reported psychiatric medication use(antidepressant, antipsychotic or anxiolytic*)* (Self-reported) ***Current prevalence*** | 200 | 27.2% | 269 | 36.6% | 266 | 36.2% | 46.4 | <.001** |
| *Antidepressant* | 148 | 26.4% | 206 | 36.8% | 206 | 36.8% | 28.8 | <.001** |
| *Antipsychotic* | 40 | 36.0% | 32 | 28.8% | 39 | 35.1% | 23.9 | <.001** |
| *Anxiolytic* | 49 | 28.6% | 65 | 38.0% | 57 | 33.3% | 14.6 | .001* |
| Alcohol/substance abuse (self-reported doctor diagnosed) ***Lifetime prevalence*** | 57 | 43.5% | 50 | 38.2% | 24 | 18.3% | 66.2 | <.001** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Depression (CES-D) (n=8,044) | | | | | | | | |
| ***Current prevalence*** | | | | | | | | |
| *None/mild (7 or less)* | 737 | **15.2%** | **1,873** | **38.7%** | **2,230** | **46.1%** | **129.4** | <.001** |
| *Moderate (8-15)* | 422 | **19.0%** | **856** | **38.5%** | **944** | **42.5%** | | |
| *Severe (16+)* | 296 | **30.2%** | **342** | **34.9%** | **343** | **35.0%** | | |
| | | | | | | | | |
| Anxiety (HADS-A) (n=6,637) | | | | | | | | |
| ***Current prevalence*** | | | | | | | | |
| *Normal (7 or less)* | 756 | **15.1%** | **1,978** | **39.4%** | **2,286** | **45.5%** | **78.6** | <.001** |
| *Possible (8-10)* | 199 | **19.4%** | **381** | **37.2%** | **444** | **43.4%** | | |
| *Probable (11+)* | 172 | **29.0%** | **201** | **33.9%** | **220** | **37.1%** | | |
| | | | | | | | | |
| **Any smoking-related disease (outcomes)** | 648 | **17.3%** | **1,573** | **42.0%** | **1,526** | **40.7%** | **44.0** | <.001** |
| ***Lifetime prevalence (self-reported doctor diagnosed)*** | | | | | | | | |
| *Respiratory* | 107 | **32.4%** | **143** | **43.3%** | **80** | **24.2%** | **70.0** | <.001** |
| *Smoker-related cancers* | 26 | **19.3%** | **69** | **51.1%** | **40** | **29.6%** | **12.3** | .002* |
| *CVD* | 583 | **16.5%** | **1,479** | **42.0%** | **1,463** | **41.5%** | **40.0** | <.001** |
| | | | | | | | | |
| **Other covariates** | | | | | | | | |
| | | | | | | | | |
| *IPAQ (Physical Activity)(n=8,096)* | | | | | | | | |
| ***Current*** | | | | | | | | |
| *Low* | 517 | **19.9%** | **955** | **36.8%** | **1,120** | **43.2%** | **11.5** | .022* |
| *Moderate* | 459 | 16.5% | 1,087 | 39.0% | 1,241 | 44.5% | | |
| *High* | 500 | 18.4% | 1,044 | 38.4% | 1,173 | 43.2% | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Alcohol problem (CAGE score of 2 or more) *(n=6,758)* ***Lifetime prevalence*** | 215 | 26.4% | 390 | 47.8% | 210 | 25.8% | 142.9 | <.001** |
| Diabetes (self-reported doctor diagnosed) ***Lifetime prevalence*** | 110 | 17.3% | 293 | 46.2% | 231 | 36.4% | 20.2 | <.001** |
| Waist cm (mean and (SD)) *(n=5,863)* ***Current*** | 93.77 | (13.9) | 97.79 | (14.0) | 93.95 | (13.5) | F=55.9 | <.001** |

## Smoking among individuals with MHD

As shown in Table 2, MHD was significantly associated with smoking status with **relative risk** ratios **for former and current smoking** ranging from **1.26 to 1.99 and 1.84 to 4.31 respectively** when adjusting for potential confounders. **Never smoker was taken as the base category.** The adjusted current smoking prevalence ranged from **25**-39% and was highest in the alcohol or substance abuse group. This compares to the crude smoking prevalence of 18.24% in the sample overall. **Adjusted former smoking prevalence ranged from 38-41% which compares to 38% in the overall sample. The never smoking prevalence was particularly low in the self-reported doctor diagnosed alcohol/substance abuse group (Model 5) at 22%, albeit from the initially low absolute prevalence of 1.6%.**

**Table 2**
**Adjusted multinomial regression models of smoking status (current/past/never) according to various indicators of MHD for TILDA cohort**

| Model | | *n* | Adjusted prevalence | Adjusted prevalence for no MHD | Adjusted RRR | 95% CI | P value |
|---|---|---|---|---|---|---|---|
| **1** | Emotional, nervous or psychiatric problem (self-reported doctor diagnosed) ***Lifetime prevalence*** | 8,154 | | | | | |
| | Never smoker | | 34% | 44% | (base) | | |
| | Former smoker | | 39% | 37% | 1.33 | 1.10-1.60 | .003* |
| | Current smoker | | 26% | 19% | 1.84 | 1.50-2.26 | <.001** |
| **2** | Psychiatric medication use (Self-reported) ***Current prevalence*** | 8,158 | | | | | |
| | Never smoker | | 35% | 44% | (base) | | |
| | Former smoker | | 38% | 38% | 1.26 | 1.05-1.52 | .012* |
| | Current smoker | | 27% | 19% | 1.84 | 1.51-2.25 | <.001** |
| **3** | Self-reported doctor diagnosed emotional, nervous or psychiatric problem***(Lifetime)*** **and** self-reported any psychiatric medication ***(Current)*** | 8,158 | | | | | |
| | Never smoker | | 33% | 43% | (base) | | |
| | Former smoker | | 41% | 38% | 1.44 | 1.11-1.86 | .006* |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Current smoker | | 26% | 19% | 1.90 | 1.40-2.55 | <.001** |
| **4** | Self-reported doctor diagnosed emotional, nervous or psychiatric problem***(Lifetime)*** **or** self-reported any psychiatric medication ***(Current)*** | 8,158 | | | | | |
| | Never smoker | | 35% | 44% | (base) | | |
| | Former smoker | | 38% | 38% | 1.26 | 1.08-1.46 | .003* |
| | Current smoker | | 26% | 18% | 1.87 | 1.58-2.21 | <.001** |
| **5** | Alcohol/Substance abuse (self-reported doctor diagnosed) ***Lifetime prevalence*** | 8,158 | | | | | |
| | Never smoker | | 22% | 43% | (base) | | |
| | Former smoker | | 38% | 38% | 1.99 | 1.19-3.33 | .009* |
| | Current smoker | | 39% | 19% | 4.31 | 2.47-7.53 | <.001** |
| **6** | Alcohol/Substance abuse **or** Emotional, nervous or psychiatric problem (self-reported doctor diagnosed) ***Lifetime prevalence*** | 8,158 | | | | | |
| | Never smoker | | 34% | 44% | (base) | | |
| | Former smoker | | 38% | 38% | 1.33 | 1.11-1.60 | .002* |
| | Current smoker | | 28% | 18% | 2.04 | 1.68-2.47 | <.001** |
| **7** | CES-D ***Current prevalence*** | 8,029 | | | | | |
| | **NONE/MILD** | **(base)** | | | | | |
| | Never smoker | | 46% | | (base) | | |
| | Former smoker | | 38% | | | | |
| | Current smoker | | 17% | | | | |
| | **MODERATE** | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Never smoker | | 41% | (base) | | |
| | Former smoker | | 38% | 1.14 | 1.01-1.29 | .036* |
| | Current smoker | | 21% | 1.33 | 1.15-1.54 | <.001** |
| | **SEVERE** | | | | | |
| | Never smoker | | 35% | (base) | | |
| | Former smoker | | 38% | 1.37 | 1.15-1.63 | <.001** |
| | Current smoker | | 26% | 2.27 | 1.88-2.75 | <.001** |
| **8** | HADS-A<br>***Current prevalence*** | 6,626 | | | | |
| | **NORMAL** | **(base)** | | | | |
| | Never smoker | | 45% | (base) | | |
| | Former smoker | | 38% | | | |
| | Current smoker | | 17% | | | |
| | **POSSIBLE ANXIETY** | | | | | |
| | Never smoker | | 41% | (base) | | |
| | Former smoker | | 39% | 1.12 | 0.96-1.32 | .141 |
| | Current smoker | | 21% | 1.30 | 1.06-1.60 | .011* |
| | **PROBABLE ANXIETY** | | | | | |
| | Never smoker | | 36% | (base) | | |
| | Former smoker | | 38% | 1.27 | 1.02-1.59 | .034* |
| | Current smoker | | 25% | 2.02 | 1.59-2.56 | <.001** |

Weighted and adjusted for age, sex, education and marital status.

## Smoking-related diseases among individuals with MHD

MHD was also significantly associated with smoking-related disease with odds ratios ranging from 1.24 to **1.62** (Table 3). The adjusted prevalence of smoking-related disease ranged from 53 to 60% and was highest in the alcohol or substance abuse group. This compares to a crude prevalence of 46% in the overall sample. As per Baron and Kenny's four steps for mediation, the independent variable, MHD, therefore predicted the dependent variable smoking-related disease (Table 3, middle columns) fulfilling the first step in Baron and Kenny's approach[50]. As per Table 2, the independent variable, MHD, also predicted smoking status thus fulfilling the second step. Further regression analyses confirmed that smoking status predicted smoking-related disease, with significant associations for former smoking (step 3). Finally in relation to step four, the addition of smoking status to models had virtually no impact indicating that smoking status was not a mediator of the association between MHD and smoking-related disease (Table 3, right columns)[50].

**Table 3**
**Adjusted logistic regression models of any smoking-related disease (respiratory disease, cardiovascular disease or smoking-related cancer) according to various indicators of MHD for TILDA cohort and with mediational analysis adjusting for smoking status (never/past/current)**

| Model | | | | | | | | Mediation analysis | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | n | Adjusted prevalence smoking-related disease | Adjusted prevalence smoking-related disease for no MHD | Adjusted OR | 95% CI | P value | Adjusted OR | 95% CI | P value |
| **1** | Emotional, nervous or psychiatric problem (self-reported doctor diagnosed) ***Lifetime prevalence*** | 5,176 | 53% | 48% | 1.24 | 1.01-1.51 | .036* | 1.23 | 1.01-1.51 | .039* |
| **2** | Psychiatric medication use (self-reported) ***Current prevalence*** | 5,176 | 55% | 48% | 1.38 | 1.12-1.70 | .002* | 1.38 | 1.12-1.70 | .002* |
| **3** | Self-reported doctor diagnosed emotional, nervous or psychiatric problem***(Lifetime)*** **and** self-reported any psychiatric medication ***(Current)*** | 5,176 | 57% | 48% | 1.46 | 1.11-1.93 | .007* | 1.45 | 1.10-1.92 | .008* |
| **4** | Self-reported doctor diagnosed emotional, nervous or psychiatric problem***(Lifetime)*** **or** self-reported any psychiatric | 5,176 | 53% | 47% | 1.27 | 1.07-1.50 | .006* | 1.27 | 1.07-1.50 | .006* |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | medication ***(Current)*** | | | | | | | | | |
| **5** | Alcohol/Substance abuse (self-reported doctor diagnosed) ***Lifetime prevalence*** | 5,176 | 60% | 48% | 1.62 | 1.00-2.62 | .048 | 1.63 | 1.01-2.61 | .044* |
| **6** | Alcohol/Substance abuse **or** Emotional, nervous or psychiatric problem (self-reported doctor diagnosed) ***Lifetime prevalence*** | 5,176 | 54% | 48% | 1.30 | 1.07-1.58 | .008* | 1.30 | 1.07-1.58 | .008* |
| **7** | CES-D ***Current prevalence*** | 5,114 | | | | | | | | |
| | NONE/MILD | | 46% | | | | | | | |
| | MODERATE | | 50% | | 1.10 | 0.96-1.26 | .160 | 1.10 | 0.96-1.26 | .190 |
| | SEVERE | | 54% | | 1.44 | 1.18-1.75 | <.001** | 1.43 | 1.18-1.74 | <.001** |
| **8** | HADS-A ***Current prevalence*** | 5,024 | | | | | | | | |
| | NORMAL | | 47% | | | | | | | |
| | POSSIBLE ANXIETY | | 51% | | 1.10 | 0.93-1.29 | .261 | 1.10 | 0.93-1.30 | .256 |
| | PROBABLE ANXIETY | | 55% | | 1.50 | 1.21-1.85 | <.001** | 1.50 | 1.21-1.85 | <.001** |

Weighted and adjusted for age, sex, education, physical activity (IPAQ), waist circumference, alcohol problem (CAGE) and diabetes.

**Table 4**
**Moderation analysis: Odds ratios for smoking and MHD interaction terms for any smoking-related disease (respiratory disease, cardiovascular disease or smoking-related cancer)**

| Model | | *n* | Adjusted OR | 95% CI | P value |
|---|---|---|---|---|---|
| **1** | Emotional, nervous or psychiatric problem (self-reported doctor diagnosed) ***Lifetime prevalence*** | 5,176 | | | |
| | [x] *Past Smoking* | | 0.62 | 0.39-0.98 | .041* |
| | [x] *Current Smoking* | | 0.66 | 0.38-1.15 | .142 |
| **2** | Psychiatric medication use (Self-reported) ***Current prevalence*** | 5,176 | | | |
| | [x] *Past Smoking* | | 1.10 | 0.69-1.74 | .699 |
| | [x] *Current Smoking* | | 1.14 | 0.68-1.91 | .627 |
| **3** | Self-reported doctor diagnosed emotional, nervous or psychiatric problem***(Lifetime)*** **and** self-reported any psychiatric medication ***(Current)*** | 5,176 | | | |
| | [x] *Past Smoking* | | 1.02 | 0.53-1.96 | .962 |
| | [x] *Current Smoking* | | 1.26 | 0.63-2.55 | .513 |
| **4** | Self-reported doctor diagnosed emotional, nervous or psychiatric problem***(Lifetime)*** **or** self-reported any psychiatric medication ***(Current)*** | 5,176 | | | |
| | [x] *Past Smoking* | | 0.76 | 0.52-1.11 | .160 |
| | [x] *Current Smoking* | | 0.77 | 0.49-1.21 | .257 |
| **5** | Alcohol/Substance abuse (self-reported doctor diagnosed) ***Lifetime prevalence*** | 5,176 | | | |
| | [x] *Past Smoking* | | 2.08 | 0.52-8.34 | .301 |
| | [x] *Current Smoking* | | 0.83 | 0.22-3.08 | .779 |
| **6** | Alcohol/Substance abuse **or** Emotional, nervous or psychiatric problem (self-reported doctor diagnosed) ***Lifetime prevalence*** | 5,176 | | | |

| | | | | | |
|---|---|---|---|---|---|
| | [x] *Past Smoking* | | 0.74 | 0.47-1.15 | .177 |
| | [x] *Current Smoking* | | 0.68 | 0.41-1.13 | .139 |
| **7** | CES-D<br>***Current prevalence*** | 5,114 | | | |
| | **MODERATE** | | | | |
| | [x] *Past Smoking* | | 0.93 | 0.70-1.24 | .638 |
| | [x] *Current Smoking* | | 0.84 | 0.56-1.25 | .389 |
| | **SEVERE** | | | | |
| | [x] *Past Smoking* | | 1.03 | 0.67-1.57 | .899 |
| | [x] *Current Smoking* | | 1.14 | 0.69-1.88 | .605 |
| **8** | HADS-A<br>***Current prevalence*** | 5,024 | | | |
| | **POSSIBLE ANXIETY** | | | | |
| | [x] *Past Smoking* | | 1.23 | 0.85-1.77 | .270 |
| | [x] *Current Smoking* | | 1.20 | 0.76-1.91 | .437 |
| | **PROBABLE ANXIETY** | | | | |
| | [x] *Past Smoking* | | 1.05 | 0.65-1.70 | .834 |
| | [x] *Current Smoking* | | 0.86 | 0.50-1.48 | .588 |

Weighted and adjusted for age, sex, education, physical activity (IPAQ), waist circumference, alcohol problem (CAGE) and diabetes.

Table 4 presents results from the moderation analysis (see Appendix B for full models). All smoking and MHD interaction terms were non-significant when main effects were included in the model, except one. Past smoking appeared to have a negative moderating effect on the association between self-reported doctor diagnosed emotional, nervous or psychiatric problems and smoking-related diseases while current smoking had no significant moderating role, although effect sizes were similar. This would suggest that those who self-reported a doctor diagnosed emotional, nervous or psychiatric problem and were former smokers were less likely to have a smoking-related disease, although this result was not replicated in any other model, suggesting it may be spurious.

## Discussion

We reported a number of important findings in a population-based dataset of older people, using multiple indicators of MHD to ensure robustness of findings. MHD, as evidenced by self-reported doctor diagnosed problems, psychiatric medication use and scores on anxiety and depression scales, was associated with smoking status in community living adults aged 50 and over in Ireland. MHD was also associated with the presence of a smoking-related disease i.e. respiratory disease, cardiovascular disease or a smoking-related cancer in this cohort. Contrary to our hypothesis, respondents' smoking status did not mediate the association between MHD and smoking-related disease. While it was expected that higher rates of smoking would be an important factor in the relationship between MHD and smoking-related disease, smoking did not fully explain the increased disease prevalence in this population. The various indicators of MHD revealed similar results. Associations with both current smoking and with smoking-related disease were strongest for self-

reported doctor diagnosed alcohol/substance use. This was the first study to examine the burden of smoking on the physical health of those with MHD in Ireland at a population level.

The first aim of the current study was to establish the prevalence of smoking and the prevalence of smoking-related disease in older adults with MHD in Ireland. The higher rates of smoking among those with MHD compared to the general population have already been established in the UK, the US and Australia [7,9,23]. Between 2009 and 2011 the general population smoking prevalence among those aged 15 and over in Ireland fell from 24.6% to 22.9%[52]. In the current study adjusted current smoking prevalences of 25 to 39% were found among those with MHD while former smoking prevalences were 38 to 41%. This compares to current smoking prevalences of 25.5 to 59% among those with MHD[3-9] found in previous studies and lifetime prevalences between 55.3 and 81% with higher rates observed in those with psychosis[7,10,11].

Increased rates of tobacco-related disease [3,28-33] have also been shown. The adjusted prevalences of smoking-related disease in the current study ranged from 53 to 60%. Previous studies have found prevalences ranging from 0.9 (peripheral vascular disorder) to 61% (raised cholesterol) for cardiovascular conditions including cardiac disease and stroke. In relation to respiratory conditions, COPD prevalences of 6.8-45.7% [3,29-32] have been reported in previous studies. Cancer morbidity studies reporting prevalence according to MHD appear to be rare though a number of mortality studies have been published.

The second aim of this study was to uncover the impact of smoking on the association between MHD and smoking-related disease. However, although the diseases included were selected by the authors to show the burden of tobacco on the physical health of those with MHD in Ireland, in the current study smoking did not mediate this association. In general, smoking status had no moderating role in the association between MHD and smoking–related diseases either. The only exception was a significant negative moderating effect of past smoking on the association between self-reported doctor diagnosed emotional, nervous or psychiatric problems and smoking-related diseases. However given this was present in just one model and not a pattern seen across exposure variables no strong conclusions can be drawn. Previous studies involving psychiatric populations or those with SMI have found elevated odds of respiratory illness, cardiovascular disease and risk of death from cardiovascular disease which were not fully explained by smoking [4,28,34]. Researchers have suggested antipsychotic medications, diet, exercise [4] smoking intensity (dose-response relationship), inhaling more deeply (as has been indicated in schizophrenia) [53,54] and greater second-hand smoke exposure [28] may form part of the explanation. It should also be noted that in the current study, cardiovascular disease, which is known to have risk factors beyond smoking, accounted for the vast majority of smoking-related disease. High cholesterol was also responsible for a large proportion of this CVD and 66% of the overall smoking-related disease outcome variable was accounted for by those with high cholesterol alone. However, only minor changes were present in a few models when cholesterol was excluded as an outcome, and the overall pattern of results remained (see Appendix C). Respiratory disease and smoking-related cancers accounted for just 4% of the smoking-related disease outcome modelled. Other risk factors for cardiovascular disease such as physical activity were assessed in this study but may not have been accurate enough to account for all excess risk. For instance, while the IPAQ is said to have reasonable measurement properties for 18-65 year olds [47] its reliability with those aged 65 and over has been questioned [55]. It is also possible that other risk factors that were not assessed may be more important.

Overall, individuals with MHD are known to die younger [18-22] and tobacco-related deaths specifically also seem to occur at an earlier age than in the general population [56]. Given that the current study involved those aged 50 and over it is likely that a proportion of those with MHD are missing from the dataset as they have already died or were terminally ill and therefore not participating. Support for this is provided by the fact that for most MHD indicators (with the exception of medications) case

respondents were significantly younger compared to the rest of the sample (data not shown). Only one of the studies cited above in describing excess morbidity and mortality was limited to an older population and it concerned those aged 65 and older and hospitalised for acute myocardial infarction [27]. Another study, linking 1,213 inpatient records to death index data, found cigarette smoking contributed to an increased risk of death in schizophrenia patients particularly in those aged 35-54 years but that in older ages (55-69 years) mortality risk was actually lower for smokers [57]. Similarly, Bandiera et al. found persons with MHD, including substance abuse, experience tobacco-related deaths at earlier ages than the general population but that after age 70 this pattern is reversed and tobacco-related deaths occur more often in the general population [56].

Although descriptive data indicated that former smokers had higher estimates of smoking-related disease and only former smoking (and not current) was predictive of smoking-related disease, as stated results from the mediation and moderation analysis show that past smoking did not explain the association between MHD and smoking-related disease. We should note in this older sample 38.1% were former smokers. Furthermore as stated this is a relatively healthy sample, missing those who have already died or were too unwell to participate.

## Strengths and Limitations

Strengths of the current study include the large nationally representative sample of older adults. The TILDA study with its robust methodology provides a detailed and rich population weighted dataset and the necessary power to adjust for many confounders. This large representative sample means results can be generalised to the population [39]. This study also included multiple measures of MHD from self-reported doctor diagnosed conditions to medication use to standardised scales.

This study was limited in that it is representative only of those aged 50 and over who are living in the community. Datasets which do not include younger people or other sectors of society, such as those not living in the community do not provide a full picture and are therefore likely to underestimate disease prevalence, particularly if those excluded tend to experience higher rate of disease and decreased life expectancy as is the case for those with severe mental illness [21]. Osborn et al. accessed the UK General Practitioners Research Database and achieved a large nationally representative community sample of people with SMI which included those in long-term care. However, as they acknowledged, homeless people may not be well-represented and as such the estimated risk of CHD death may still be even greater than it appears [4]. This is again especially relevant in the case of MHD given, as noted in the UK, the striking disparity of prevalence of psychiatric disorders in different subsections of the population [58]. In addition to these challenges in gaining representative samples of those with SMI the exclusion of those in residential care is also an issue as while this covers only around 2% of those aged 50 and over, it represents a greater proportion of those in older age categories and people in residential care tend to have more chronic disease [59]. Future research could look to include surveys of institutions and the homeless in addition to households.

This study also largely relied on self-reported doctor diagnosed conditions and involved an older population introducing issues including under diagnosis of conditions and under-reporting. This older sample in particular may potentially under-report conditions and medications due to memory but also due to stigma and social desirability bias [60], particularly in the case of questions around mental health within the context of a face-to-face interview. A 2007 national survey in Ireland revealed just over half of respondents agreed with the statement ‘If I was experiencing mental health problems, I wouldn’t want people knowing about it’ [61]. Self-report data in relation to smoking has however been shown to be accurate in most studies [62].

In addition to potential underreporting, psychiatric medications such as benzodiazepines can be prescribed for short term conditions such as insomnia or as muscle relaxants for pain and thus would not necessarily indicate MHD. Furthermore the role which psychiatric medications themselves can play in terms of weight gain and metabolic effects is also a factor [63]. Nonetheless the similar pattern of results across models (including those based on self-reported doctor diagnosed MHD and scale scores) provides reassurance that this alone was not responsible for the increased risk of disease in those with indicated MHD after controlling for smoking.

Arguably some models were overfitted due to the inclusion of the CAGE questionnaire (for consistency of models) as a covariate when modelling the presence of smoking-related disease based on self-reported doctor diagnosed alcohol/substance abuse however removal had little impact on results (data not shown).

As with all observational studies we cannot rule out the potential for residual confounding. Finally, the fact that it was not possible to include cancers of the lip, the renal pelvis and acute myeloid leukaemia is a further limitation.

## Conclusion

Among older community living adults in Ireland indicators of MHD was associated with a higher prevalence of current smoking and self-reported doctor diagnosed cardiovascular disease, respiratory diseases and smoking-related cancers. This increased risk of smoking-related disease remained even after adjusting for smoking status.


### *Funding*

This work was supported by the Health Research Board of Ireland (HRB) through the HRB Structured PhD in Population Health and Health Services Research (SPHeRE) programme (SPHeRE/2013/01).


### *Declaration of Interests*

The authors declare no conflicts of interest.


### *Acknowledgments*

The authors would like to thank Dr. Mark Ward (Research Fellow at The Irish Longitudinal Study on Ageing) for his comments on a previous version of this manuscript and Ms Siobhan Scarlett (Research Assistant and Data manager at The Irish Longitudinal Study on Ageing) for her guidance on data cleaning.


## References


1. Hickey P, Evans D. Smoking in Ireland 2014: synopsis of key patterns. *Dublin: Health Service Executive.* 2015.
2. *Smoking statistics.* ASH: London: Action on Smoking and Health.; June 2016.
3. Partti K, Vasankari T, Kanervisto M, et al. *Lung function and respiratory diseases in people with psychosis: population-based study.* 2015.
4. Osborn DP, Levy G, Nazareth I, Petersen I, Islam A, King MB. Relative risk of cardiovascular and cancer mortality in people with severe mental illness from the United Kingdom's General Practice Rsearch Database. *Arch Gen Psychiatry.* 2007;64(2):242-249.
5. Smith PH, Mazure CM, McKee SA. Smoking and mental illness in the U.S. population. *Tob Control.* 2014;23(e2):e147-153.

6. McManus S, Meltzer H, Campion J. Cigarette smoking and mental health in England. *Data from the Adult Psychiatric Morbidity Survey National Centre for Social Research.* 2010.
7. Lasser K, Boyd JW, Woolhandler S, Himmelstein DU, McCormick D, Bor DH. Smoking and mental illness: A population-based prevalence study. *Jama.* 2000;284(20):2606-2610.
8. Poirier MF, Canceil O, Bayle F, et al. Prevalence of smoking in psychiatric patients. *Prog Neuropsychopharmacol Biol Psychiatry.* 2002;26(3):529-537.
9. Lawrence D, Mitrou F, Zubrick SR. Smoking and mental illness: results from population surveys in Australia and the United States. *BMC Public Health.* 2009;9:285-285.
10. Cooper J, Mancuso SG, Borland R, Slade T, Galletly C, Castle D. Tobacco smoking among people living with a psychotic illness: the second Australian Survey of Psychosis. *Aust N Z J Psychiatry.* 2012;46(9):851-863.
11. Hartz SM, Pato CN, Medeiros H, et al. Comorbidity of severe psychotic disorders with measures of substance use. *JAMA Psychiatry.* 2014;71(3):248-254.
12. Bowden JA, Miller CL, Hiller JE. Smoking and mental illness: a population study in South Australia. *Australian and New Zealand Journal of Psychiatry.* 2011;45(4):325-331.
13. Jackson JG, Diaz FJ, Lopez L, de Leon J. A combined analysis of worldwide studies demonstrates an association between bipolar disorder and tobacco smoking behaviors in adults. *Bipolar Disord.* 2015;17(6):575-597.
14. Zhang XY, Liang J, Chen da C, et al. Cigarette smoking in male patients with chronic schizophrenia in a Chinese population: prevalence and relationship to clinical phenotypes. *PLoS One.* 2012;7(2):e30937.
15. Control CfD, Prevention. Vital signs: current cigarette smoking among adults aged≥ 18 years with mental illness-United States, 2009-2011. *MMWR Morbidity and mortality weekly report.* 2013;62(5):81.
16. Ho SY, Alnashri N, Rohde D, Murphy P, Doyle F. Systematic review and meta-analysis of the impact of depression on subsequent smoking cessation in patients with chronic respiratory conditions. *Gen Hosp Psychiatry.* 2015;37(5):399-407.
17. Doyle F, Rohde D, Rutkowska A, Morgan K, Cousins G, McGee H. Systematic review and meta-analysis of the impact of depression on subsequent smoking cessation in patients with coronary heart disease: 1990 to 2013. *Psychosom Med.* 2014;76(1):44-57.
18. Odegard O. Mortality in Norwegian mental hospitals 1926-1941. *Acta Genet Stat Med.* 1951;2(2):141-173.
19. Chesney E, Goodwin GM, Fazel S. Risks of all-cause and suicide mortality in mental disorders: a meta-review. *World Psychiatry.* 2014;13(2):153-160.
20. Chang CK, Hayes RD, Perera G, et al. Life expectancy at birth for people with serious mental illness and other major disorders from a secondary mental health care case register in London. *PLoS One.* 2011;6(5):e19590.
21. Colton CW, Manderscheid RW. Congruencies in increased mortality rates, years of potential life lost, and causes of death among public mental health clients in eight states. *Prev Chronic Dis.* 2006;3(2):A42.
22. Lawrence D, Hancock KJ, Kisely S. The gap in life expectancy from preventable physical illness in psychiatric patients in Western Australia: retrospective analysis of population based registers. *BMJ.* 2013;346:f2539.
23. Royal College of Physicians RCoP. *Smoking and mental health. London: RCP. Royal College of Psychiatrists Council Report CR178*2013.
24. Harker K, Cheeseman, H. The stolen years: The mental health and smoking action report. April 2016.
25. Callaghan RC, Veldhuizen S, Jeysingh T, et al. Patterns of tobacco-related mortality among individuals diagnosed with schizophrenia, bipolar disorder, or depression. *J Psychiatr Res.* 2014;48(1):102-110.

26. Tran E, Rouillon F, Loze JY, et al. Cancer mortality in patients with schizophrenia: an 11-year prospective cohort study. *Cancer.* 2009;115(15):3555-3562.
27. Druss BG, Bradford WD, Rosenheck RA, Radford MJ, Krumholz HM. Quality of medical care and excess mortality in older patients with mental disorders. *Arch Gen Psychiatry.* 2001;58(6):565-572.
28. Sokal J, Messias E, Dickerson FB, et al. Comorbidity of medical illnesses among adults with serious mental illness who are receiving community psychiatric services. *J Nerv Ment Dis.* 2004;192(6):421-427.
29. Carney CP, Jones L, Woolson RF. Medical comorbidity in women and men with schizophrenia: a population-based controlled study. *J Gen Intern Med.* 2006;21(11):1133-1137.
30. Batki SL, Meszaros ZS, Strutynski K, et al. Medical comorbidity in patients with schizophrenia and alcohol dependence. *Schizophr Res.* 2009;107(2-3):139-146.
31. Copeland LA, Mortensen EM, Zeber JE, Pugh MJ, Restrepo MI, Dalack GW. Pulmonary disease among inpatient decedents: Impact of schizophrenia. *Prog Neuropsychopharmacol Biol Psychiatry.* 2007;31(3):720-726.
32. Himelhoch S, Lehman A, Kreyenbuhl J, Daumit G, Brown C, Dixon L. Prevalence of chronic obstructive pulmonary disease among those with serious mental illness. *Prevalence.* 2004;161(12).
33. Jones DR, Macias C, Barreira PJ, Fisher WH, Hargreaves WA, Harding CM. Prevalence, severity, and co-occurrence of chronic physical health problems of persons with serious mental illness. *Psychiatr Serv.* 2004;55(11):1250-1257.
34. Gallagher D, O'Regan C, Savva GM, Cronin H, Lawlor BA, Kenny RA. Depression, anxiety and cardiovascular disease: which symptoms are associated with increased risk in community dwelling older adults? *J Affect Disord.* 2012;142(1-3):132-138.
35. Masterson E, O'Shea B. Smoking and malignancy in schizophrenia. *Br J Psychiatry.* 1984;145:429-432.
36. Pal SK, Katheria V, Hurria A. Evaluating the older patient with cancer: understanding frailty and the geriatric assessment. *CA Cancer J Clin.* 2010;60(2):120-132.
37. Who is at Risk for Heart Disease? - NHLBI, NIH. 2016; https://www.nhlbi.nih.gov/health/health-topics/topics/hdw/atrisk]. Accessed 19th September 2016.
38. Savva G. Methodology. *Fifty plus in Ireland.* 2011:293-303.
39. Barrett A, Burke H, Cronin H, et al. Fifty plus in Ireland 2011: first results from the Irish Longitudinal Study on Ageing (TILDA). 2011.
40. Kearney PM, Cronin H, O'Regan C, et al. Cohort profile: the Irish longitudinal study on ageing. *International journal of epidemiology.* 2011;40(4):877-884.
41. Warren GW, Alberg AJ, Kraft AS, Cummings KM. The 2014 Surgeon General's report: "The Health Consequences of Smoking–50 Years of Progress": A paradigm shift in cancer care. *Cancer.* 2014;120(13):1914-1916.
42. Radloff LS. The CES-D scale a self-report depression scale for research in the general population. *Applied psychological measurement.* 1977;1(3):385-401.
43. Lewinsohn PM, Seeley JR, Roberts RE, Allen NB. Center for Epidemiologic Studies Depression Scale (CES-D) as a screening instrument for depression among community-residing older adults. *Psychol Aging.* 1997;12(2):277-287.
44. O'Regan C, Cronin H, Kenny RA. 6 Mental Health And Cognitive Function. *Fifty Plus in Ireland 2011.* 2011:155.
45. Vahia IV, Meeks TW, Thompson WK, et al. Subthreshold depression and successful aging in older women. *Am J Geriatr Psychiatry.* 2010;18(3):212-220.
46. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand.* 1983;67(6):361-370.

47. Craig CL, Marshall AL, Sjostrom M, et al. International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc.* 2003;35(8):1381-1395.
48. Kenny RA, Whelan BJ, Cronin H, et al. The design of the Irish longitudinal study on ageing. 2010.
49. Mayfield D, McLeod G, Hall P. The CAGE questionnaire: validation of a new alcoholism screening instrument. *Am J Psychiatry.* 1974;131(10):1121-1123.
50. Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology.* 1986;51(6):1173.
51. StataCorp L. Stata 13.0. *College Station, Texas: StataCorp LP.* 2014.
52. HSE. http://www.hse.ie/eng/about/Who/TobaccoControl/Research/Half-Year-Tracker-Update-2016.pdf. 2016.
53. Olincy A, Young DA, Freedman R. Increased levels of the nicotine metabolite cotinine in schizophrenic smokers compared to other smokers. *Biol Psychiatry.* 1997;42(1):1-5.
54. Viegi G, Scognamiglio A, Baldacci S, Pistelli F, Carrozzi L. Epidemiology of chronic obstructive pulmonary disease (COPD). *Respiration.* 2001;68(1):4-19.
55. Tomioka K, Iwamoto J, Saeki K, Okamoto N. Reliability and validity of the International Physical Activity Questionnaire (IPAQ) in elderly adults: the Fujiwara-kyo Study. *J Epidemiol.* 2011;21(6):459-465.
56. Bandiera FC, Anteneh B, Le T, Delucchi K, Guydish J. Tobacco-related mortality among persons with mental health and substance abuse problems. *PLoS One.* 2015;10(3):e0120581.
57. Kelly DL, McMahon RP, Wehring HJ, et al. Cigarette smoking and mortality risk in people with schizophrenia. *Schizophr Bull.* 2011;37(4):832-838.
58. Farrell M, Howes S, Taylor C, et al. Substance misuse and psychiatric comorbidity: an overview of the OPCS National Psychiatric Morbidity Survey. *Addict Behav.* 1998;23(6):909-918.
59. Normand C, Kamiya Y, Timonen V, Whelan B. 7 Health And Social Care Utilisation. *Fifty Plus in Ireland 2011.* 2011:203.
60. Van de Mortel TF. Faking it: social desirability response bias in self-report research. *Australian Journal of Advanced Nursing, The.* 2008;25(4):40.
61. Barry MM, Perry I, Van Lente E, et al. SLÁN 2007: Survey of Lifestyle, Attitudes and Nutrition in Ireland. Mental Health and Social Well-Being. 2009.
62. Patrick DL, Cheadle A, Thompson DC, Diehr P, Koepsell T, Kinne S. The validity of self-reported smoking: a review and meta-analysis. *Am J Public Health.* 1994;84(7):1086-1093.
63. Newcomer JW. Second-generation (atypical) antipsychotics and metabolic effects: a comprehensive literature review. *CNS Drugs.* 2005;19 Suppl 1:1-93.

# Appendices

## Variables Key:

### OUTCOMES:

_IBEHsmoker1= former smoker

_IBEHsmoker2= current smoker

smokcond= smoking-related disease

### EXPOSURES:

anymhprob= Emotional, nervous or psychiatric problem (self-reported doctor diagnosed)

SRpsychmeduse = Psychiatric medication use (self-reported)

SRmed_prob = Self-reported doctor diagnosed emotional, nervous or psychiatric problem **and** self-reported any psychiatric medication

SRmedORprob = Self-reported doctor diagnosed emotional, nervous or psychiatric problem **or** self-reported any psychiatric medication

ph301_08 = Alcohol/Substance abuse (self-reported doctor diagnosed)

SUorMHprob = Alcohol/Substance abuse **or** Emotional, nervous or psychiatric problem (self-reported doctor diagnosed)

_IMHdep3_1 = Mild/Moderate depressive symptoms as per CES-D

_IMHdep3_2 = Severe depressive symptoms as per CES-D

_Ihadsacat_1 = possible anxiety as per HADS-A

_Ihadsacat_2 = probable anxiety as per HADS-A

### COVARIATES:

FRwaist= waistcm

BEHcage2= Alcohol problem as per CAGE

ph201_05= diabetes (self-reported doctor diagnosed)

_IFRexercis_1 = Moderate engagement in Physical activity

_IFRexercis_2 = High engagement in Physical activity

_Iedu3_2 = Secondary education (High School) highest achieved

_Iedu3_3 = Third level education (Higher education) achieved

# Appendix A

# Table 3: Full models

## Model 1

### (a)Without smoking

```
. xi: svy:logistic smokcond anymh age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  10,    609)   =      14.56
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| anymhprob | 1.237551 | .1257682 | 2.10 | 0.036 | 1.013651 | 1.510906 |
| age | 1.0265 | .0036739 | 7.31 | 0.000 | 1.01931 | 1.03374 |
| sex | 1.0685 | .0719664 | 0.98 | 0.326 | .9361194 | 1.219601 |
| _Iedu3_2 | 1.009032 | .0742629 | 0.12 | 0.903 | .8732433 | 1.165936 |
| _Iedu3_3 | 1.085357 | .0848508 | 1.05 | 0.295 | .9308866 | 1.265459 |
| _IFRexercis_1 | .9041984 | .0694445 | -1.31 | 0.190 | .7776089 | 1.051396 |
| _IFRexercis_2 | .7165416 | .0561189 | -4.26 | 0.000 | .6143916 | .8356753 |
| FRwaist | 1.008298 | .0025244 | 3.30 | 0.001 | 1.003352 | 1.013268 |
| BEHcage2 | 1.095218 | .0932107 | 1.07 | 0.286 | .9266484 | 1.294452 |
| ph201_05 | 1.787601 | .2289432 | 4.54 | 0.000 | 1.390083 | 2.298795 |
| _cons | .0775207 | .0294089 | -6.74 | 0.000 | .0368014 | .1632941 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

### (b) With smoking

```
. xi: svy:logistic smokcond anymh age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmoker
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  12,    607)   =      14.22
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| anymhprob | 1.234538 | .1254472 | 2.07 | 0.039 | 1.011207 | 1.507192 |
| age | 1.025631 | .0036762 | 7.06 | 0.000 | 1.018437 | 1.032876 |
| sex | 1.100587 | .0747171 | 1.41 | 0.159 | .9632173 | 1.257548 |
| _Iedu3_2 | 1.01341 | .0748605 | 0.18 | 0.857 | .8765635 | 1.17162 |
| _Iedu3_3 | 1.087542 | .0860915 | 1.06 | 0.290 | .930961 | 1.270459 |
| _IFRexercis_1 | .8953813 | .0687301 | -1.44 | 0.150 | .7700891 | 1.041058 |
| _IFRexercis_2 | .7107863 | .0561118 | -4.32 | 0.000 | .6087102 | .8299798 |
| FRwaist | 1.007606 | .0025262 | 3.02 | 0.003 | 1.002657 | 1.012579 |
| BEHcage2 | 1.059326 | .0925939 | 0.66 | 0.510 | .8922396 | 1.257702 |
| ph201_05 | 1.80079 | .2315685 | 4.57 | 0.000 | 1.398911 | 2.318122 |
| _IBEHsmoker_1 | 1.310613 | .0874873 | 4.05 | 0.000 | 1.149589 | 1.494191 |
| _IBEHsmoker_2 | 1.040272 | .0884299 | 0.46 | 0.642 | .8803338 | 1.229268 |
| _cons | .07522 | .0285066 | -6.83 | 0.000 | .0357368 | .1583257 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

## Model 2

### (a) Without smoking

```
. xi: svy:logistic smokcond SRpsych age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  10,    609)   =      14.80
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| SRpsychmeduse | 1.379983 | .1447372 | 3.07 | 0.002 | 1.123108 | 1.695609 |
| age | 1.025881 | .0036755 | 7.13 | 0.000 | 1.018688 | 1.033124 |
| sex | 1.059975 | .0713581 | 0.87 | 0.387 | .9287095 | 1.209794 |
| _Iedu3_2 | 1.017984 | .0752703 | 0.24 | 0.810 | .8803984 | 1.177071 |
| _Iedu3_3 | 1.102589 | .0862986 | 1.25 | 0.213 | .9454967 | 1.285781 |
| _IFRexercis_1 | .9145195 | .0705879 | -1.16 | 0.247 | .7858929 | 1.064198 |
| _IFRexercis_2 | .723978 | .0568187 | -4.12 | 0.000 | .6205702 | .8446169 |
| FRwaist | 1.008206 | .0025265 | 3.26 | 0.001 | 1.003257 | 1.01318 |
| BEHcage2 | 1.090501 | .0925329 | 1.02 | 0.308 | .9231174 | 1.288236 |
| ph201_05 | 1.760399 | .2249526 | 4.43 | 0.000 | 1.369705 | 2.262535 |
| _cons | .0802973 | .0304096 | -6.66 | 0.000 | .0381687 | .1689252 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

## (b)With smoking

```
. xi: svy:logistic smokcond SRpsych age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmoker
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  12,    607)   =      14.55
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| SRpsychmeduse | 1.382203 | .1451107 | 3.08 | 0.002 | 1.12469 | 1.698676 |
| age | 1.024981 | .0036761 | 6.88 | 0.000 | 1.017787 | 1.032226 |
| sex | 1.091599 | .0741571 | 1.29 | 0.197 | .9552644 | 1.24739 |
| _Iedu3_2 | 1.021925 | .0758016 | 0.29 | 0.770 | .8833995 | 1.182173 |
| _Iedu3_3 | 1.104022 | .0874545 | 1.25 | 0.212 | .9449696 | 1.289845 |
| _IFRexercis_1 | .9054861 | .0698403 | -1.29 | 0.198 | .7782151 | 1.053571 |
| _IFRexercis_2 | .7180903 | .0568022 | -4.19 | 0.000 | .6147739 | .8387697 |
| FRwaist | 1.007508 | .0025286 | 2.98 | 0.003 | 1.002555 | 1.012486 |
| BEHcage2 | 1.055053 | .0919675 | 0.61 | 0.539 | .8890592 | 1.252039 |
| ph201_05 | 1.773583 | .2275213 | 4.47 | 0.000 | 1.378612 | 2.281712 |
| _IBEHsmoker_1 | 1.310537 | .0875631 | 4.05 | 0.000 | 1.149384 | 1.494286 |
| _IBEHsmoker_2 | 1.034043 | .0882866 | 0.39 | 0.695 | .8744207 | 1.222804 |
| _cons | .0782138 | .0295853 | -6.74 | 0.000 | .0372112 | .1643966 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

# Model 3

## (a) Without smoking

```
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  10,    609)   =      14.76
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| SRmed_prob | 1.464173 | .2068191 | 2.70 | 0.007 | 1.109485 | 1.932249 |
| age | 1.026241 | .0036845 | 7.21 | 0.000 | 1.019031 | 1.033502 |
| sex | 1.065686 | .0715629 | 0.95 | 0.344 | .9340218 | 1.215909 |
| _Iedu3_2 | 1.006909 | .0742678 | 0.09 | 0.926 | .8711316 | 1.163848 |
| _Iedu3_3 | 1.086845 | .0850237 | 1.06 | 0.287 | .9320683 | 1.267324 |
| _IFRexercis_1 | .9056727 | .0696059 | -1.29 | 0.198 | .7787954 | 1.05322 |
| _IFRexercis_2 | .7159475 | .056035 | -4.27 | 0.000 | .613945 | .8348969 |
| FRwaist | 1.008132 | .0025264 | 3.23 | 0.001 | 1.003183 | 1.013106 |
| BEHcage2 | 1.096178 | .0932248 | 1.08 | 0.281 | .9275737 | 1.29543 |
| ph201_05 | 1.787929 | .228844 | 4.54 | 0.000 | 1.390554 | 2.298861 |
| _cons | .080527 | .030505 | -6.65 | 0.000 | .03827 | .1694433 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

## (b)With smoking

```
. xi: svy:logistic smokcond SRmed_pr age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmoker
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  12,    607)   =      14.39
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| SRmed_prob | 1.45431 | .2052323 | 2.65 | 0.008 | 1.1023 | 1.918732 |
| age | 1.025382 | .0036856 | 6.97 | 0.000 | 1.018169 | 1.032645 |
| sex | 1.097712 | .0743531 | 1.38 | 0.169 | .960991 | 1.253884 |
| _Iedu3_2 | 1.011404 | .0748538 | 0.15 | 0.878 | .8745888 | 1.169622 |
| _Iedu3_3 | 1.089272 | .0862692 | 1.08 | 0.281 | .9323728 | 1.272573 |
| _IFRexercis_1 | .896905 | .0688903 | -1.42 | 0.157 | .7713267 | 1.042929 |
| _IFRexercis_2 | .7102466 | .0560302 | -4.34 | 0.000 | .6083135 | .8292603 |
| FRwaist | 1.00745 | .0025278 | 2.96 | 0.003 | 1.002498 | 1.012427 |
| BEHcage2 | 1.060262 | .0925926 | 0.67 | 0.503 | .8931658 | 1.25862 |
| ph201_05 | 1.801525 | .2316062 | 4.58 | 0.000 | 1.399568 | 2.318924 |
| _IBEHsmoker_1 | 1.309521 | .0873705 | 4.04 | 0.000 | 1.148707 | 1.492848 |
| _IBEHsmoker_2 | 1.041459 | .0884907 | 0.48 | 0.633 | .8814043 | 1.230577 |
| _cons | .0780183 | .0295173 | -6.74 | 0.000 | .0371127 | .1640101 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

# Model 4

## (a) Without smoking

```
. xi: svy:logistic smokcond SRmedORpro age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =       5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =         618
                                                F(  10,    609)   =       14.77
                                                Prob > F          =      0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| SRmedORprob | 1.266851 | .108994 | 2.75 | 0.006 | 1.069912 | 1.500039 |
| age | 1.026288 | .0036703 | 7.26 | 0.000 | 1.019105 | 1.033521 |
| sex | 1.0619 | .0715968 | 0.89 | 0.373 | .930208 | 1.212236 |
| _Iedu3_2 | 1.017199 | .0750028 | 0.23 | 0.817 | .8800748 | 1.175688 |
| _Iedu3_3 | 1.096644 | .0857825 | 1.18 | 0.239 | .9404845 | 1.278732 |
| _IFRexercis_1 | .9109257 | .0701193 | -1.21 | 0.226 | .7831273 | 1.059579 |
| _IFRexercis_2 | .722995 | .0567135 | -4.13 | 0.000 | .6197748 | .8434058 |
| FRwaist | 1.00832 | .0025264 | 3.31 | 0.001 | 1.003371 | 1.013293 |
| BEHcage2 | 1.088159 | .0925151 | 0.99 | 0.321 | .9208344 | 1.285889 |
| ph201_05 | 1.765129 | .225762 | 4.44 | 0.000 | 1.373071 | 2.269132 |
| _cons | .0773209 | .0293282 | -6.75 | 0.000 | .0367112 | .1628528 |

```
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

## (b) With smoking

```
. xi: svy:logistic smokcond SRmedORpro age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmoker
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =       5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =         618
                                                F(  12,    607)   =       14.47
                                                Prob > F          =      0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| SRmedORprob | 1.269649 | .1094227 | 2.77 | 0.006 | 1.071964 | 1.503789 |
| age | 1.025382 | .0036724 | 7.00 | 0.000 | 1.018195 | 1.032619 |
| sex | 1.093462 | .0743357 | 1.31 | 0.189 | .9568059 | 1.249636 |
| _Iedu3_2 | 1.021053 | .0755397 | 0.28 | 0.778 | .8829807 | 1.180717 |
| _Iedu3_3 | 1.09778 | .0869306 | 1.18 | 0.239 | .9396763 | 1.282484 |
| _IFRexercis_1 | .9018409 | .0693701 | -1.34 | 0.180 | .7754013 | 1.048898 |
| _IFRexercis_2 | .7170925 | .0566933 | -4.21 | 0.000 | .61397 | .8375355 |
| FRwaist | 1.007616 | .0025282 | 3.02 | 0.003 | 1.002663 | 1.012593 |
| BEHcage2 | 1.052865 | .0919195 | 0.59 | 0.555 | .8869787 | 1.249775 |
| ph201_05 | 1.778148 | .2282504 | 4.48 | 0.000 | 1.381942 | 2.287947 |
| _IBEHsmoker_1 | 1.310445 | .087583 | 4.05 | 0.000 | 1.149258 | 1.494239 |
| _IBEHsmoker_2 | 1.032335 | .0881112 | 0.37 | 0.709 | .8730253 | 1.220715 |
| _cons | .0754188 | .0285646 | -6.82 | 0.000 | .0358474 | .1586725 |

```
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

# Model 5

## (c) Without smoking

```
Survey: Logistic regression

Number of strata   =         3                  Number of obs     =       5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =         618
                                                F(  10,    609)   =       14.40
                                                Prob > F          =      0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| ph301_08 | 1.621718 | .3960678 | 1.98 | 0.048 | 1.003877 | 2.61981 |
| age | 1.026179 | .0036752 | 7.22 | 0.000 | 1.018987 | 1.033422 |
| sex | 1.088015 | .0735384 | 1.25 | 0.212 | .9527739 | 1.242454 |
| _Iedu3_2 | 1.009965 | .0743475 | 0.13 | 0.893 | .8740232 | 1.16705 |
| _Iedu3_3 | 1.090482 | .0850749 | 1.11 | 0.267 | .9355801 | 1.271031 |
| _IFRexercis_1 | .9045659 | .0697545 | -1.30 | 0.194 | .7774493 | 1.052467 |
| _IFRexercis_2 | .7136885 | .0560787 | -4.29 | 0.000 | .6116366 | .8327678 |
| FRwaist | 1.008419 | .002524 | 3.35 | 0.001 | 1.003475 | 1.013388 |
| BEHcage2 | 1.089362 | .0927134 | 1.01 | 0.315 | .9216928 | 1.287534 |
| ph201_05 | 1.791575 | .2293781 | 4.55 | 0.000 | 1.393287 | 2.303719 |
| _cons | .0768554 | .0291881 | -6.76 | 0.000 | .0364562 | .1620234 |

```
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

## (b) With smoking

```
. xi: svy:logistic smokcond ph301_08 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 i.BEHsmoker ph201_05
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  12,    607)   =      14.28
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| ph301_08 | 1.626877 | .3915438 | 2.02 | 0.044 | 1.014127 | 2.60986 |
| age | 1.025301 | .0036757 | 6.97 | 0.000 | 1.018108 | 1.032545 |
| sex | 1.120745 | .0763921 | 1.67 | 0.095 | .9803328 | 1.281269 |
| _Iedu3_2 | 1.014118 | .0749238 | 0.19 | 0.850 | .877158 | 1.172464 |
| _Iedu3_3 | 1.09231 | .086246 | 1.12 | 0.264 | .935417 | 1.275518 |
| _IFRexercis_1 | .8956376 | .0690385 | -1.43 | 0.153 | .769822 | 1.042016 |
| _IFRexercis_2 | .707908 | .0560795 | -4.36 | 0.000 | .6059175 | .827066 |
| FRwaist | 1.00772 | .0025279 | 3.07 | 0.002 | 1.002768 | 1.012697 |
| BEHcage2 | 1.053633 | .0921944 | 0.60 | 0.551 | .8872828 | 1.251172 |
| _IBEHsmoker_1 | 1.311328 | .0878709 | 4.04 | 0.000 | 1.149638 | 1.495758 |
| _IBEHsmoker_2 | 1.037771 | .088609 | 0.43 | 0.664 | .8775665 | 1.227222 |
| ph201_05 | 1.804705 | .232084 | 4.59 | 0.000 | 1.401934 | 2.323192 |
| _cons | .0746714 | .0283481 | -6.83 | 0.000 | .0354301 | .1573755 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

# Model 6

## (a) Without smoking

```
. xi: svy:logistic smokcond SUorMHprob age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  10,    609)   =      14.81
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| SUorMHprob | 1.299556 | .1278101 | 2.66 | 0.008 | 1.071312 | 1.576428 |
| age | 1.026585 | .0036754 | 7.33 | 0.000 | 1.019393 | 1.033829 |
| sex | 1.070687 | .0720582 | 1.01 | 0.311 | .9381311 | 1.221973 |
| _Iedu3_2 | 1.009466 | .0743245 | 0.13 | 0.898 | .8735683 | 1.166505 |
| _Iedu3_3 | 1.084879 | .0847556 | 1.04 | 0.297 | .9305742 | 1.26477 |
| _IFRexercis_1 | .9043058 | .069484 | -1.31 | 0.191 | .7776486 | 1.051592 |
| _IFRexercis_2 | .7166433 | .0561191 | -4.25 | 0.000 | .6144919 | .8357762 |
| FRwaist | 1.008295 | .0025262 | 3.30 | 0.001 | 1.003346 | 1.013268 |
| BEHcage2 | 1.084347 | .092782 | 0.95 | 0.344 | .9166266 | 1.282756 |
| ph201_05 | 1.782171 | .2283116 | 4.51 | 0.000 | 1.385763 | 2.291973 |
| _cons | .0764754 | .0290256 | -6.77 | 0.000 | .0362929 | .1611469 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

## (b) With smoking

```
. xi: svy:logistic smokcond SUorMHprob age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 i.BEHsmoker ph201_05
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs      =       5,176
Number of PSUs     =       621                  Population size    = 735,169.58
                                                Design df          =         618
                                                F(  12,    607)    =       14.43
                                                Prob > F           =      0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| SUorMHprob | 1.29964 | .1273904 | 2.67 | 0.008 | 1.072074 | 1.575511 |
| age | 1.025686 | .0036773 | 7.07 | 0.000 | 1.01849 | 1.032933 |
| sex | 1.102559 | .0748111 | 1.44 | 0.151 | .9650113 | 1.259711 |
| _Iedu3_2 | 1.013347 | .0748816 | 0.18 | 0.858 | .8764662 | 1.171606 |
| _Iedu3_3 | 1.08616 | .0859171 | 1.04 | 0.297 | .9298874 | 1.268696 |
| _IFRexercis_1 | .895241 | .068751 | -1.44 | 0.150 | .7699149 | 1.040968 |
| _IFRexercis_2 | .7107426 | .0561063 | -4.33 | 0.000 | .6086763 | .8299241 |
| FRwaist | 1.007591 | .0025271 | 3.02 | 0.003 | 1.002641 | 1.012566 |
| BEHcage2 | 1.049351 | .0921615 | 0.55 | 0.584 | .8831109 | 1.246884 |
| _IBEHsmoker_1 | 1.30967 | .087511 | 4.04 | 0.000 | 1.148613 | 1.49331 |
| _IBEHsmoker_2 | 1.033824 | .08788 | 0.39 | 0.696 | .8748801 | 1.221645 |
| ph201_05 | 1.795832 | .2310084 | 4.55 | 0.000 | 1.39494 | 2.311934 |
| _cons | .0745693 | .0282587 | -6.85 | 0.000 | .0354288 | .1569508 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

# Model 7

## (a) Without smoking

```
. xi: svy:logistic smokcond i.MHdep3 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.MHdep3          _IMHdep3_0-2        (naturally coded; _IMHdep3_0 omitted)
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs      =       5,114
Number of PSUs     =       621                  Population size    = 726,602.54
                                                Design df          =         618
                                                F(  11,    608)    =       14.06
                                                Prob > F           =      0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| _IMHdep3_1 | 1.102078 | .0761348 | 1.41 | 0.160 | .962262 | 1.262209 |
| _IMHdep3_2 | 1.437912 | .1418919 | 3.68 | 0.000 | 1.1846 | 1.745392 |
| age | 1.026604 | .0037083 | 7.27 | 0.000 | 1.019347 | 1.033912 |
| sex | 1.052126 | .0710983 | 0.75 | 0.452 | .9213708 | 1.201438 |
| _Iedu3_2 | 1.023082 | .0763908 | 0.31 | 0.760 | .8835456 | 1.184656 |
| _Iedu3_3 | 1.108003 | .0878865 | 1.29 | 0.197 | .948181 | 1.294763 |
| _IFRexercis_1 | .932721 | .0723014 | -0.90 | 0.369 | .8010137 | 1.086084 |
| _IFRexercis_2 | .7390371 | .0590413 | -3.79 | 0.000 | .6317289 | .8645731 |
| FRwaist | 1.008697 | .0025629 | 3.41 | 0.001 | 1.003677 | 1.013743 |
| BEHcage2 | 1.07402 | .0932652 | 0.82 | 0.411 | .9056303 | 1.273718 |
| ph201_05 | 1.776224 | .2281291 | 4.47 | 0.000 | 1.380255 | 2.28579 |
| _cons | .0696026 | .0269832 | -6.87 | 0.000 | .0325078 | .1490264 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

## (b)With smoking

```
. xi: svy:logistic smokcond i.MHdep3 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmok
i.MHdep3          _IMHdep3_0-2        (naturally coded; _IMHdep3_0 omitted)
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs      =       5,114
Number of PSUs     =       621                  Population size    = 726,602.54
                                                Design df          =         618
                                                F(  13,    606)    =       13.93
                                                Prob > F           =      0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| _IMHdep3_1 | 1.095576 | .0761712 | 1.31 | 0.190 | .955753 | 1.255855 |
| _IMHdep3_2 | 1.434219 | .1425743 | 3.63 | 0.000 | 1.179865 | 1.743407 |
| age | 1.025623 | .0037076 | 7.00 | 0.000 | 1.018367 | 1.03293 |
| sex | 1.086124 | .073997 | 1.21 | 0.226 | .9501101 | 1.24161 |
| _Iedu3_2 | 1.025595 | .0768492 | 0.34 | 0.736 | .8852565 | 1.188182 |
| _Iedu3_3 | 1.107285 | .0887752 | 1.27 | 0.204 | .9459786 | 1.296096 |
| _IFRexercis_1 | .9230285 | .0714861 | -1.03 | 0.301 | .7927979 | 1.074652 |
| _IFRexercis_2 | .7324825 | .0589685 | -3.87 | 0.000 | .6253697 | .8579415 |
| FRwaist | 1.007977 | .00257 | 3.12 | 0.002 | 1.002943 | 1.013037 |
| BEHcage2 | 1.04071 | .0926855 | 0.45 | 0.654 | .8737219 | 1.239614 |
| ph201_05 | 1.790972 | .2306301 | 4.53 | 0.000 | 1.390789 | 2.306302 |
| _IBEHsmoker_1 | 1.323108 | .0878426 | 4.22 | 0.000 | 1.161374 | 1.507365 |
| _IBEHsmoker_2 | 1.024225 | .0878383 | 0.28 | 0.780 | .8654713 | 1.2121 |
| _cons | .0680809 | .026369 | -6.94 | 0.000 | .0318194 | .1456661 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

# Model 8

## (a) Without smoking

```
. xi: svy:logistic smokcond i.hadsacat age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.hadsacat        _Ihadsacat_0-2      (naturally coded; _Ihadsacat_0 omitted)
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs      =       5,024
Number of PSUs     =       621                  Population size    = 710,730.54
                                                Design df          =         618
                                                F(  11,    608)    =       13.64
                                                Prob > F           =      0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| _Ihadsacat_1 | 1.09858 | .0917952 | 1.13 | 0.261 | .9323246 | 1.294482 |
| _Ihadsacat_2 | 1.496827 | .1632717 | 3.70 | 0.000 | 1.208208 | 1.854392 |
| age | 1.027706 | .00382 | 7.35 | 0.000 | 1.020231 | 1.035235 |
| sex | 1.035845 | .0699892 | 0.52 | 0.602 | .9071275 | 1.182826 |
| _Iedu3_2 | 1.015245 | .076344 | 0.20 | 0.841 | .8758641 | 1.176805 |
| _Iedu3_3 | 1.116682 | .0892559 | 1.38 | 0.168 | .9544645 | 1.306469 |
| _IFRexercis_1 | .9101549 | .0710517 | -1.21 | 0.228 | .7807922 | 1.060951 |
| _IFRexercis_2 | .7301481 | .0579354 | -3.96 | 0.000 | .6247953 | .8532654 |
| FRwaist | 1.009017 | .0024844 | 3.65 | 0.000 | 1.00415 | 1.013907 |
| BEHcage2 | 1.051524 | .0920491 | 0.57 | 0.566 | .8854409 | 1.248758 |
| ph201_05 | 1.753067 | .2281942 | 4.31 | 0.000 | 1.35763 | 2.263683 |
| _cons | .0674473 | .0258426 | -7.04 | 0.000 | .0317822 | .1431347 |

```
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

## (b)With smoking

```
. xi: svy:logistic smokcond i.hadsacat age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmok
i.hadsacat        _Ihadsacat_0-2      (naturally coded; _Ihadsacat_0 omitted)
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs      =       5,024
Number of PSUs     =       621                  Population size    = 710,730.54
                                                Design df          =         618
                                                F(  13,    606)    =       13.38
                                                Prob > F           =      0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| _Ihadsacat_1 | 1.100201 | .0923482 | 1.14 | 0.256 | .933005 | 1.297358 |
| _Ihadsacat_2 | 1.495448 | .1628773 | 3.69 | 0.000 | 1.207481 | 1.85209 |
| age | 1.026886 | .0038213 | 7.13 | 0.000 | 1.019409 | 1.034418 |
| sex | 1.064812 | .0726421 | 0.92 | 0.358 | .9312998 | 1.217465 |
| _Iedu3_2 | 1.018793 | .0767206 | 0.25 | 0.805 | .8787394 | 1.181168 |
| _Iedu3_3 | 1.118151 | .0901461 | 1.39 | 0.166 | .9544236 | 1.309964 |
| _IFRexercis_1 | .9006629 | .0702896 | -1.34 | 0.181 | .7726849 | 1.049838 |
| _IFRexercis_2 | .7239247 | .0578765 | -4.04 | 0.000 | .6187394 | .8469914 |
| FRwaist | 1.008335 | .0024879 | 3.36 | 0.001 | 1.003461 | 1.013233 |
| BEHcage2 | 1.017081 | .0910507 | 0.19 | 0.850 | .8531103 | 1.212568 |
| ph201_05 | 1.764122 | .2305717 | 4.34 | 0.000 | 1.364765 | 2.280339 |
| _IBEHsmoker_1 | 1.295249 | .0894389 | 3.75 | 0.000 | 1.130997 | 1.483356 |
| _IBEHsmoker_2 | 1.038245 | .0892794 | 0.44 | 0.663 | .8769218 | 1.229246 |
| _cons | .0657427 | .0250815 | -7.13 | 0.000 | .0310791 | .1390681 |

```
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

# Appendix B

# Table 4: Full models

## Model 1

```
. svy:logistic smokcond anymh##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =       5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =         618
                                                F(  14,    605)   =       12.66
                                                Prob > F          =      0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| anymhprob | | | | | | |
| Any emotional, nervous or psychiatri.. | 1.630822 | .2719888 | 2.93 | 0.003 | 1.175343 | 2.262813 |
| BEHsmoker | | | | | | |
| Past | 1.359658 | .0933449 | 4.48 | 0.000 | 1.188167 | 1.555902 |
| Current | 1.078698 | .0969985 | 0.84 | 0.400 | .9040821 | 1.287038 |
| anymhprob#BEHsmoker | | | | | | |
| Any emotional, nervous or psychiatri.. # Past | .6183188 | .1454773 | -2.04 | 0.041 | .389538 | .9814657 |
| Any emotional, nervous or psychiatri.. # Current | .6641042 | .184828 | -1.47 | 0.142 | .3844784 | 1.147098 |
| age | 1.025475 | .0036751 | 7.02 | 0.000 | 1.018283 | 1.032717 |
| sex | 1.103302 | .0750582 | 1.45 | 0.149 | .9653241 | 1.261002 |
| edu3 | | | | | | |
| Secondary | 1.009462 | .0744968 | 0.13 | 0.898 | .8732713 | 1.166892 |
| Third/higher | 1.084939 | .0858814 | 1.03 | 0.303 | .9287398 | 1.26741 |
| FRexercise3 | | | | | | |
| 1 | .8935618 | .0685223 | -1.47 | 0.143 | .7686393 | 1.038787 |
| 2 | .7095864 | .0560543 | -4.34 | 0.000 | .60762 | .828664 |
| FRwaist | 1.007671 | .0025332 | 3.04 | 0.002 | 1.002708 | 1.012658 |
| BEHcage2 | 1.060296 | .0925472 | 0.67 | 0.503 | .8932738 | 1.258547 |
| ph201_05 | 1.80406 | .2317361 | 4.59 | 0.000 | 1.401836 | 2.321691 |
| _cons | .0739615 | .028082 | -6.86 | 0.000 | .0350901 | .1558932 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

## Model 2

```
. svy:logistic smokcond SRpsych##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =       5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =         618
                                                F(  14,    605)   =       12.48
                                                Prob > F          =      0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| 1.SRpsychmeduse | 1.297284 | .2088335 | 1.62 | 0.106 | .9456745 | 1.779623 |
| BEHsmoker | | | | | | |
| Past | 1.301294 | .0883692 | 3.88 | 0.000 | 1.138827 | 1.486938 |
| Current | 1.020256 | .0925037 | 0.22 | 0.825 | .8538504 | 1.219093 |
| SRpsychmeduse#BEHsmoker | | | | | | |
| 1#Past | 1.095841 | .2592987 | 0.39 | 0.699 | .6885583 | 1.744033 |
| 1#Current | 1.136532 | .299006 | 0.49 | 0.627 | .6779581 | 1.905288 |
| age | 1.024967 | .0036764 | 6.88 | 0.000 | 1.017773 | 1.032212 |
| sex | 1.091953 | .0741545 | 1.30 | 0.196 | .9556201 | 1.247735 |
| edu3 | | | | | | |
| Secondary | 1.022185 | .0759219 | 0.30 | 0.768 | .8834529 | 1.182704 |
| Third/higher | 1.103937 | .0875675 | 1.25 | 0.213 | .9446958 | 1.290021 |
| FRexercise3 | | | | | | |
| 1 | .9050218 | .0698351 | -1.29 | 0.196 | .7777644 | 1.053101 |
| 2 | .717635 | .0568227 | -4.19 | 0.000 | .6142892 | .8383675 |
| FRwaist | 1.007516 | .0025304 | 2.98 | 0.003 | 1.002559 | 1.012498 |
| BEHcage2 | 1.055762 | .0921665 | 0.62 | 0.534 | .88943 | 1.253201 |
| ph201_05 | 1.772415 | .2271999 | 4.46 | 0.000 | 1.377967 | 2.279776 |
| _cons | .0785821 | .029747 | -6.72 | 0.000 | .0373656 | .1652628 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

# Model 3

```
. svy:logistic smokcond SRmed_pr##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  14,    605)   =      12.33
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| 1.SRmed_prob | 1.369492 | .3150943 | 1.37 | 0.172 | .8716256 | 2.151738 |
| BEHsmoker | | | | | | |
| Past | 1.309271 | .0885333 | 3.99 | 0.000 | 1.146458 | 1.495206 |
| Current | 1.028553 | .0900576 | 0.32 | 0.748 | .8660671 | 1.221525 |
| SRmed_prob#BEHsmoker | | | | | | |
| 1#Past | 1.01601 | .3398438 | 0.05 | 0.962 | .526771 | 1.959629 |
| 1#Current | 1.264095 | .4529284 | 0.65 | 0.513 | .6254513 | 2.554852 |
| age | 1.025372 | .0036867 | 6.97 | 0.000 | 1.018157 | 1.032637 |
| sex | 1.098424 | .07434 | 1.39 | 0.166 | .9617202 | 1.25456 |
| edu3 | | | | | | |
| Secondary | 1.011671 | .0749477 | 0.16 | 0.876 | .8746933 | 1.170099 |
| Third/higher | 1.089545 | .0863739 | 1.08 | 0.280 | .932467 | 1.273083 |
| FRexercise3 | | | | | | |
| 1 | .8970542 | .0689331 | -1.41 | 0.158 | .7714019 | 1.043174 |
| 2 | .7108355 | .0561511 | -4.32 | 0.000 | .6086926 | .8301186 |
| FRwaist | 1.007474 | .0025307 | 2.96 | 0.003 | 1.002516 | 1.012456 |
| BEHcage2 | 1.060054 | .0927677 | 0.67 | 0.505 | .8926707 | 1.258823 |
| ph201_05 | 1.802646 | .2317644 | 4.58 | 0.000 | 1.400418 | 2.320403 |
| _cons | .0779327 | .0295152 | -6.74 | 0.000 | .0370437 | .1639553 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

# Model 4

```
. svy:logistic smokcond SRmedORpro##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  14,    605)   =      12.69
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| 1.SRmedORprob | 1.492947 | .2021675 | 2.96 | 0.003 | 1.144334 | 1.947763 |
| BEHsmoker | | | | | | |
| Past | 1.353024 | .0934111 | 4.38 | 0.000 | 1.181474 | 1.549482 |
| Current | 1.072893 | .1005177 | 0.75 | 0.453 | .8925902 | 1.289617 |
| SRmedORprob#BEHsmoker | | | | | | |
| 1#Past | .759972 | .1481897 | -1.41 | 0.160 | .5181947 | 1.114557 |
| 1#Current | .7684323 | .1784267 | -1.13 | 0.257 | .4870488 | 1.21238 |
| age | 1.025347 | .0036754 | 6.98 | 0.000 | 1.018155 | 1.03259 |
| sex | 1.094029 | .074277 | 1.32 | 0.186 | .9574687 | 1.250066 |
| edu3 | | | | | | |
| Secondary | 1.01931 | .0754276 | 0.26 | 0.796 | .8814442 | 1.178739 |
| Third/higher | 1.097228 | .0868643 | 1.17 | 0.242 | .9392424 | 1.281788 |
| FRexercise3 | | | | | | |
| 1 | .9017799 | .0692617 | -1.35 | 0.179 | .775524 | 1.04859 |
| 2 | .7173392 | .0566842 | -4.20 | 0.000 | .6142293 | .8377579 |
| FRwaist | 1.007644 | .0025315 | 3.03 | 0.003 | 1.002685 | 1.012628 |
| BEHcage2 | 1.053643 | .0918697 | 0.60 | 0.549 | .887829 | 1.250424 |
| ph201_05 | 1.778446 | .228083 | 4.49 | 0.000 | 1.382488 | 2.287812 |
| _cons | .0739991 | .0280826 | -6.86 | 0.000 | .0351206 | .1559161 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

# Model 5

```
. svy:logistic smokcond ph301_08##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  14,    605)   =      12.16
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| ph301_08 | | | | | | |
| Alcohal or substance abuse | 1.312154 | .7531831 | 0.47 | 0.636 | .4250424 | 4.05077 |
| BEHsmoker | | | | | | |
| Past | 1.298639 | .0872515 | 3.89 | 0.000 | 1.138117 | 1.481803 |
| Current | 1.052447 | .0915118 | 0.59 | 0.557 | .8872409 | 1.248414 |
| ph301_08#BEHsmoker | | | | | | |
| Alcohal or substance abuse#Past | 2.078484 | 1.470453 | 1.03 | 0.301 | .5180486 | 8.339173 |
| Alcohal or substance abuse#Current | .829078 | .5544593 | -0.28 | 0.779 | .2229583 | 3.082955 |
| age | 1.025382 | .0036766 | 6.99 | 0.000 | 1.018187 | 1.032628 |
| sex | 1.120976 | .0763352 | 1.68 | 0.094 | .9806598 | 1.28137 |
| edu3 | | | | | | |
| Secondary | 1.011261 | .0748969 | 0.15 | 0.880 | .874374 | 1.169579 |
| Third/higher | 1.091663 | .0862662 | 1.11 | 0.268 | .9347433 | 1.274926 |
| FRexercise3 | | | | | | |
| 1 | .8958383 | .0691116 | -1.43 | 0.154 | .7698972 | 1.042381 |
| 2 | .7068867 | .0559638 | -4.38 | 0.000 | .6051018 | .8257929 |
| FRwaist | 1.007664 | .0025283 | 3.04 | 0.002 | 1.002711 | 1.012641 |
| BEHcage2 | 1.06011 | .0928484 | 0.67 | 0.505 | .8925928 | 1.259067 |
| ph201_05 | 1.801502 | .2318459 | 4.57 | 0.000 | 1.39918 | 2.319508 |
| _cons | .0748855 | .0284376 | -6.83 | 0.000 | .035524 | .1578607 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

# Model 6

```
. svy:logistic smokcond SUorMHprob##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  14,    605)   =      12.71
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| 1.SUorMHprob | 1.602668 | .2608603 | 2.90 | 0.004 | 1.164192 | 2.206289 |
| BEHsmoker | | | | | | |
| Past | 1.342062 | .0924768 | 4.27 | 0.000 | 1.172207 | 1.53653 |
| Current | 1.077734 | .0984324 | 0.82 | 0.413 | .9007751 | 1.289456 |
| SUorMHprob#BEHsmoker | | | | | | |
| 1#Past | .7375661 | .1659904 | -1.35 | 0.177 | .4740901 | 1.147469 |
| 1#Current | .6824651 | .1758956 | -1.48 | 0.139 | .4114006 | 1.132129 |
| age | 1.025623 | .0036808 | 7.05 | 0.000 | 1.01842 | 1.032877 |
| sex | 1.101907 | .0747553 | 1.43 | 0.153 | .9644609 | 1.258941 |
| edu3 | | | | | | |
| Secondary | 1.010323 | .0746615 | 0.14 | 0.890 | .8738446 | 1.168117 |
| Third/higher | 1.083708 | .0857933 | 1.02 | 0.310 | .9276698 | 1.265992 |
| FRexercise3 | | | | | | |
| 1 | .8945133 | .0686612 | -1.45 | 0.147 | .7693464 | 1.040044 |
| 2 | .7095178 | .0560336 | -4.35 | 0.000 | .6075868 | .828549 |
| FRwaist | 1.007603 | .0025321 | 3.01 | 0.003 | 1.002643 | 1.012588 |
| BEHcage2 | 1.051392 | .0923735 | 0.57 | 0.569 | .8847751 | 1.249386 |
| ph201_05 | 1.799012 | .2312319 | 4.57 | 0.000 | 1.397694 | 2.31556 |
| _cons | .0738442 | .0280062 | -6.87 | 0.000 | .0350635 | .1555166 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

# Model 7

```
. svy:logistic smokcond i.MHdep3##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,114
Number of PSUs     =       621                  Population size   = 726,602.54
                                                Design df         =        618
                                                F(  17,    602)   =      10.79
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| MHdep3 | | | | | | |
| Moderate | 1.159126 | .1152498 | 1.49 | 0.138 | .9535233 | 1.409062 |
| Severe | 1.368344 | .2151222 | 1.99 | 0.047 | 1.004876 | 1.863281 |
| BEHsmoker | | | | | | |
| Past | 1.343824 | .1144614 | 3.47 | 0.001 | 1.136837 | 1.588497 |
| Current | 1.054529 | .1220281 | 0.46 | 0.647 | .8401677 | 1.323584 |
| MHdep3#BEHsmoker | | | | | | |
| Moderate#Past | .9340227 | .1352615 | -0.47 | 0.638 | .7028261 | 1.241272 |
| Moderate#Current | .83789 | .171955 | -0.86 | 0.389 | .5599605 | 1.253766 |
| Severe#Past | 1.027574 | .2202592 | 0.13 | 0.899 | .6745301 | 1.5654 |
| Severe#Current | 1.140164 | .2889548 | 0.52 | 0.605 | .6931415 | 1.875482 |
| age | 1.025675 | .0037 | 7.03 | 0.000 | 1.018434 | 1.032967 |
| sex | 1.084525 | .0739956 | 1.19 | 0.235 | .948526 | 1.240023 |
| edu3 | | | | | | |
| Secondary | 1.026095 | .0769611 | 0.34 | 0.731 | .8855618 | 1.18893 |
| Third/higher | 1.107539 | .0889296 | 1.27 | 0.204 | .945971 | 1.296702 |
| FRexercise3 | | | | | | |
| 1 | .9237316 | .0715353 | -1.02 | 0.306 | .7934107 | 1.075458 |
| 2 | .7335202 | .0592091 | -3.84 | 0.000 | .6259923 | .8595184 |
| FRwaist | 1.007916 | .0025758 | 3.09 | 0.002 | 1.00287 | 1.012987 |
| BEHcage2 | 1.041551 | .0931108 | 0.46 | 0.649 | .87385 | 1.241435 |
| ph201_05 | 1.786459 | .230155 | 4.50 | 0.000 | 1.387123 | 2.300759 |
| _cons | .0676514 | .0262549 | -6.94 | 0.000 | .0315707 | .1449671 |

```
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

# Model 8

```
. svy:logistic smokcond i.hadsacat##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,024
Number of PSUs     =       621                  Population size   = 710,730.54
                                                Design df         =        618
                                                F(  17,    602)   =      10.40
                                                Prob > F          =     0.0000
```

| smokcond | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| hadsacat | | | | | | |
| Possible | .9845129 | .1232845 | -0.12 | 0.901 | .7698773 | 1.258987 |
| Probable | 1.528822 | .2663601 | 2.44 | 0.015 | 1.085837 | 2.152529 |
| BEHsmoker | | | | | | |
| Past | 1.249145 | .1002776 | 2.77 | 0.006 | 1.066957 | 1.462443 |
| Current | 1.028897 | .1079946 | 0.27 | 0.786 | .837246 | 1.264418 |
| hadsacat#BEHsmoker | | | | | | |
| Possible#Past | 1.228629 | .2293027 | 1.10 | 0.270 | .8516216 | 1.772535 |
| Possible#Current | 1.201007 | .2829365 | 0.78 | 0.437 | .7561771 | 1.907512 |
| Probable#Past | 1.052647 | .2577016 | 0.21 | 0.834 | .6508615 | 1.702459 |
| Probable#Current | .8614548 | .2369222 | -0.54 | 0.588 | .501962 | 1.478408 |
| age | 1.026921 | .0038267 | 7.13 | 0.000 | 1.019434 | 1.034464 |
| sex | 1.064691 | .0727707 | 0.92 | 0.359 | .9309591 | 1.217634 |
| edu3 | | | | | | |
| Secondary | 1.020503 | .0767904 | 0.27 | 0.787 | .8803147 | 1.183017 |
| Third/higher | 1.121494 | .0903907 | 1.42 | 0.155 | .9573197 | 1.313824 |
| FRexercise3 | | | | | | |
| 1 | .901794 | .070335 | -1.33 | 0.186 | .7737274 | 1.051058 |
| 2 | .7245489 | .0578781 | -4.03 | 0.000 | .6193539 | .8476108 |
| FRwaist | 1.008291 | .0024944 | 3.34 | 0.001 | 1.003404 | 1.013201 |
| BEHcage2 | 1.013822 | .0908063 | 0.15 | 0.878 | .8502982 | 1.208793 |
| ph201_05 | 1.773076 | .2318277 | 4.38 | 0.000 | 1.371561 | 2.292131 |
| _cons | .0667862 | .025566 | -7.07 | 0.000 | .0314923 | .1416344 |

```
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

# Appendix C

# Models for smoking-related disease without High Cholesterol

```
. xi: svy:logistic smokcondw anymh age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  10,    609)   =      28.15
                                                Prob > F          =     0.0000
```

| smokcondw | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| anymhprob | 1.22178 | .1871988 | 1.31 | 0.192 | .9043103 | 1.650701 |
| age | 1.05948 | .0054799 | 11.17 | 0.000 | 1.048773 | 1.070296 |
| sex | .6012562 | .0576319 | -5.31 | 0.000 | .4980921 | .7257874 |
| _Iedu3_2 | .7656137 | .0775376 | -2.64 | 0.009 | .6275308 | .9340806 |
| _Iedu3_3 | .6363177 | .0734374 | -3.92 | 0.000 | .5072757 | .7981857 |
| _IFRexercis_1 | .9344513 | .0949063 | -0.67 | 0.505 | .7654836 | 1.140716 |
| _IFRexercis_2 | .5698032 | .0627627 | -5.11 | 0.000 | .4589684 | .7074032 |
| FRwaist | 1.008683 | .0037207 | 2.34 | 0.019 | 1.001403 | 1.016017 |
| BEHcage2 | .9058755 | .1309752 | -0.68 | 0.494 | .6819567 | 1.203318 |
| ph201_05 | 1.37402 | .2099374 | 2.08 | 0.038 | 1.017847 | 1.854829 |
| _cons | .0055841 | .0033247 | -8.71 | 0.000 | .0017344 | .0179783 |

```
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

```
. xi: svy:logistic smokcondw anymh age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmok
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  12,    607)   =      26.83
                                                Prob > F          =     0.0000
```

| smokcondw | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| anymhprob | 1.176805 | .1789214 | 1.07 | 0.285 | .8730398 | 1.586263 |
| age | 1.060529 | .0054983 | 11.34 | 0.000 | 1.049786 | 1.071382 |
| sex | .6564685 | .0639991 | -4.32 | 0.000 | .5420851 | .7949874 |
| _Iedu3_2 | .7906697 | .0806304 | -2.30 | 0.022 | .6471747 | .9659813 |
| _Iedu3_3 | .6622479 | .0773455 | -3.53 | 0.000 | .5265161 | .8329704 |
| _IFRexercis_1 | .9384052 | .0952712 | -0.63 | 0.531 | .7687815 | 1.145455 |
| _IFRexercis_2 | .5730999 | .0631814 | -5.05 | 0.000 | .4615358 | .7116316 |
| FRwaist | 1.008371 | .0037073 | 2.27 | 0.024 | 1.001117 | 1.015678 |
| BEHcage2 | .8166668 | .1190619 | -1.39 | 0.165 | .6133447 | 1.08739 |
| ph201_05 | 1.356291 | .2108596 | 1.96 | 0.050 | .9994446 | 1.840547 |
| _IBEHsmoker_1 | 1.758815 | .161222 | 6.16 | 0.000 | 1.469067 | 2.105711 |
| _IBEHsmoker_2 | 1.768436 | .2304527 | 4.37 | 0.000 | 1.36914 | 2.284182 |
| _cons | .0033439 | .002013 | -9.47 | 0.000 | .0010253 | .0109059 |

```
Note: Variances scaled within each stage to handle strata with a single
```

```
. xi: svy:logistic smokcondw SRpsych age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  10,    609)   =      28.36
                                                Prob > F          =     0.0000
```

| smokcondw | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| SRpsychmeduse | 1.513881 | .1977889 | 3.17 | 0.002 | 1.171288 | 1.956679 |
| age | 1.058919 | .005455 | 11.11 | 0.000 | 1.04826 | 1.069686 |
| sex | .59009 | .0569132 | -5.47 | 0.000 | .4882702 | .7131424 |
| _Iedu3_2 | .7776889 | .0796243 | -2.46 | 0.014 | .6360393 | .9508846 |
| _Iedu3_3 | .6510767 | .0754319 | -3.70 | 0.000 | .5185861 | .8174167 |
| _IFRexercis_1 | .949848 | .0969502 | -0.50 | 0.614 | .7773242 | 1.160663 |
| _IFRexercis_2 | .5802694 | .0638166 | -4.95 | 0.000 | .4675553 | .7201557 |
| FRwaist | 1.008472 | .0037343 | 2.28 | 0.023 | 1.001165 | 1.015832 |
| BEHcage2 | .8935293 | .1291474 | -0.78 | 0.436 | .6727255 | 1.186806 |
| ph201_05 | 1.34197 | .2043657 | 1.93 | 0.054 | .9950867 | 1.809776 |
| _cons | .0057971 | .003461 | -8.63 | 0.000 | .0017948 | .0187238 |

```
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

```
. xi: svy:logistic smokcondw SRpsych age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmok
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  12,     607)  =      27.16
                                                Prob > F          =     0.0000

------------------------------------------------------------------------------
             |             Linearized
    smokcondw | Odds Ratio   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
SRpsychmeduse |   1.461301   .1903324     2.91   0.004     1.131499    1.887231
          age |    1.05991   .0054673    11.28   0.000     1.049227    1.070701
          sex |   .6444071   .0633032    -4.47   0.000     .5313475    .7815233
      _Iedu3_2 |    .800668   .0824072    -2.16   0.031     .6541424    .9800148
      _Iedu3_3 |   .6744656   .0790557    -3.36   0.001     .5357876    .8490376
_IFRexercis_1 |   .9513966   .0969949    -0.49   0.625     .7787738    1.162283
_IFRexercis_2 |   .5820102   .0641185    -4.91   0.000     .4687831    .7225855
       FRwaist |   1.008123   .0037243     2.19   0.029     1.000835    1.015463
     BEHcage2 |   .8079197   .1174856    -1.47   0.143     .6072195    1.074956
     ph201_05 |   1.326571   .2058163     1.82   0.069     .9781561    1.799089
_IBEHsmoker_1 |   1.753284    .160784     6.12   0.000     1.464334    2.099252
_IBEHsmoker_2 |    1.73706    .226581     4.23   0.000     1.344519    2.244207
        _cons |   .0035257   .0021271    -9.36   0.000     .0010782     .011529
------------------------------------------------------------------------------

Note: Variances scaled within each stage to handle strata with a single
      sampling unit.


. xi: svy:logistic smokcondw SRmed_pr age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  10,     609)  =      28.26
                                                Prob > F          =     0.0000

------------------------------------------------------------------------------
             |             Linearized
    smokcondw | Odds Ratio   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   SRmed_prob |   1.036016   .2196739     0.17   0.868     .6831655    1.571111
          age |   1.059108   .0054658    11.13   0.000     1.048428    1.069896
          sex |   .6051377   .0582446    -5.22   0.000     .5009163    .7310436
      _Iedu3_2 |    .765306   .0776293    -2.64   0.009     .6270808    .9339996
      _Iedu3_3 |   .6388293   .0736766    -3.89   0.000     .5093573    .8012115
_IFRexercis_1 |   .9328765   .0947697    -0.68   0.494      .764156    1.138849
_IFRexercis_2 |   .5671466   .0622671    -5.17   0.000     .4571496    .7036105
       FRwaist |   1.008749   .0037202     2.36   0.018      1.00147    1.016082
     BEHcage2 |   .9152475   .1318568    -0.61   0.539     .6897124    1.214532
     ph201_05 |     1.3806   .2105077     2.12   0.035     1.023353    1.862558
        _cons |   .0057111   .0033845    -8.72   0.000     .0017836    .0182869
------------------------------------------------------------------------------

Note: Variances scaled within each stage to handle strata with a single
      sampling unit.


. xi: svy:logistic smokcondw SRmed_pr age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsm
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  12,     607)  =      27.04
                                                Prob > F          =     0.0000

------------------------------------------------------------------------------
             |             Linearized
    smokcondw | Odds Ratio   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   SRmed_prob |   .9828814   .2034953    -0.08   0.934       .65452    1.475976
          age |    1.06024    .005486    11.30   0.000     1.049521    1.071069
          sex |    .661134   .0647043    -4.23   0.000     .5455317    .8012332
      _Iedu3_2 |   .7905718   .0807351    -2.30   0.022     .6469101    .9661369
      _Iedu3_3 |   .6649546   .0775543    -3.50   0.001     .5288357    .8361097
_IFRexercis_1 |   .9369666   .0951782    -0.64   0.522     .7675177    1.143826
_IFRexercis_2 |   .5706786   .0627217    -5.10   0.000     .4598908    .7081551
       FRwaist |   1.008491    .003708     2.30   0.022     1.001235    1.015799
     BEHcage2 |   .8236899   .1197096    -1.33   0.183     .6191745    1.095758
     ph201_05 |   1.362124   .2114356     1.99   0.047     1.004222    1.847581
_IBEHsmoker_1 |   1.761938   .1612925     6.19   0.000      1.47203    2.108943
_IBEHsmoker_2 |   1.785016   .2325139     4.45   0.000     1.382128    2.305346
        _cons |   .0033704   .0020216    -9.49   0.000     .0010378    .0109456
------------------------------------------------------------------------------

Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

```
. xi: svy:logistic smokcondw SRmedORpro age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  10,    609)   =      28.85
                                                Prob > F          =     0.0000

------------------------------------------------------------------------------
             |             Linearized
   smokcondw |  Odds Ratio   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  SRmedORprob |   1.530582   .1740639     3.74   0.000     1.224235    1.913589
         age |   1.059618   .0054779    11.20   0.000     1.048914     1.07043
         sex |   .5874139    .056422    -5.54   0.000     .4864348    .7093553
     _Iedu3_2 |   .7790613     .07941    -2.45   0.015     .6377318    .9517112
     _Iedu3_3 |   .6467977   .0748766    -3.76   0.000     .5152709    .8118977
_IFRexercis_1 |   .9517123   .0973107    -0.48   0.629     .7785764    1.163349
_IFRexercis_2 |   .5838203   .0646583    -4.86   0.000     .4697029    .7256632
      FRwaist |   1.008656   .0037331     2.33   0.020     1.001352    1.016014
     BEHcage2 |   .8826204   .1277523    -0.86   0.389     .6642439     1.17279
     ph201_05 |   1.334966   .2040263     1.89   0.059     .9888348    1.802258
        _cons |   .0053831   .0032248    -8.72   0.000       .00166    .0174564
------------------------------------------------------------------------------

Note: Variances scaled within each stage to handle strata with a single
      sampling unit.


. xi: svy:logistic smokcondw SRmedORpro age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsm
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  12,    607)   =      27.56
                                                Prob > F          =     0.0000

------------------------------------------------------------------------------
             |             Linearized
   smokcondw |  Odds Ratio   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  SRmedORprob |   1.484346   .1693906     3.46   0.001     1.186334    1.857219
         age |   1.060529   .0054899    11.35   0.000     1.049802    1.071365
         sex |   .6412521   .0627373    -4.54   0.000     .5291607    .7770878
     _Iedu3_2 |   .8022218   .0823027    -2.15   0.032     .6558363    .9812813
     _Iedu3_3 |    .670078   .0785357    -3.42   0.001     .5323111    .8435003
_IFRexercis_1 |   .9534111   .0973783    -0.47   0.641     .7801366    1.165171
_IFRexercis_2 |   .5855039   .0649395    -4.83   0.000     .4709078    .7279871
      FRwaist |   1.008256   .0037231     2.23   0.026     1.000971    1.015594
     BEHcage2 |   .7988129   .1164069    -1.54   0.124     .6000127    1.063481
     ph201_05 |   1.321441    .205602     1.79   0.074     .9735314    1.793682
_IBEHsmoker_1 |    1.75461   .1610513     6.13   0.000     1.465202    2.101181
_IBEHsmoker_2 |   1.719187   .2243939     4.15   0.000     1.330465    2.221481
        _cons |   .0033138   .0020045    -9.44   0.000     .0010102    .0108699
------------------------------------------------------------------------------

Note: Variances scaled within each stage to handle strata with a single
      sampling unit.


. xi: svy:logistic smokcondw i.MHdep3 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.MHdep3          _IMHdep3_0-2        (naturally coded; _IMHdep3_0 omitted)
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,114
Number of PSUs     =       621                  Population size   = 726,602.54
                                                Design df         =        618
                                                F(  11,    608)   =      27.43
                                                Prob > F          =     0.0000

------------------------------------------------------------------------------
             |             Linearized
   smokcondw |  Odds Ratio   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   _IMHdep3_1 |    1.12346   .1152116     1.14   0.257     .9185337    1.374106
   _IMHdep3_2 |   2.200019   .2687292     6.45   0.000      1.73081    2.796427
         age |   1.061846    .005574    11.43   0.000     1.050956    1.072849
         sex |   .5771161    .055727    -5.69   0.000      .477429    .6976177
     _Iedu3_2 |   .8020906    .082157    -2.15   0.032     .6559412    .9808033
     _Iedu3_3 |   .6804589   .0797751    -3.28   0.001     .5405222    .8566241
_IFRexercis_1 |   .9812816    .101013    -0.18   0.854     .8016764    1.201125
_IFRexercis_2 |   .6057035   .0677972    -4.48   0.000     .4861799     .754611
      FRwaist |    1.00931   .0037014     2.53   0.012     1.002068    1.016606
     BEHcage2 |   .8657007   .1257532    -0.99   0.321     .6508458    1.151483
     ph201_05 |   1.354147   .2067818     1.99   0.048     1.003298    1.827686
        _cons |   .0039908   .0023684    -9.31   0.000     .0012442    .0127998
------------------------------------------------------------------------------

Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

```
. xi: svy:logistic smokcondw i.MHdep3 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmok
i.MHdep3          _IMHdep3_0-2        (naturally coded; _IMHdep3_0 omitted)
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,114
Number of PSUs     =       621                  Population size   = 726,602.54
                                                Design df         =        618
                                                F(  13,     606)  =      26.28
                                                Prob > F          =     0.0000

------------------------------------------------------------------------------
             |             Linearized
    smokcondw | Odds Ratio   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   _IMHdep3_1 |   1.100742   .1139192     0.93   0.354     .8982959    1.348814
   _IMHdep3_2 |   2.111721   .2599864     6.07   0.000      1.65819    2.689296
          age |   1.062521   .0055978    11.51   0.000     1.051585    1.073571
          sex |   .6306986   .0621918    -4.67   0.000     .5196632    .7654586
     _Iedu3_2 |   .8227505   .0851115    -1.89   0.060     .6714918    1.008081
     _Iedu3_3 |   .7020685   .0833815    -2.98   0.003     .5560166    .8864845
_IFRexercis_1 |   .9801624   .1011308    -0.19   0.846     .8003883    1.200315
_IFRexercis_2 |   .6042924   .0679503    -4.48   0.000     .4845571    .7536145
      FRwaist |    1.00886   .0037054     2.40   0.017      1.00161    1.016163
     BEHcage2 |   .7898529   .1154629    -1.61   0.107     .5927493    1.052498
     ph201_05 |   1.339399   .2085073     1.88   0.061     .9866006    1.818354
_IBEHsmoker_1 |   1.770713   .1635737     6.19   0.000     1.476938    2.122923
_IBEHsmoker_2 |   1.660015   .2163422     3.89   0.000     1.285171    2.144188
        _cons |   .0025306   .0015267    -9.91   0.000      .000774    .0082746
------------------------------------------------------------------------------
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.


. xi: svy:logistic smokcondw i.hadsac age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.hadsacat        _Ihadsacat_0-2      (naturally coded; _Ihadsacat_0 omitted)
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,024
Number of PSUs     =       621                  Population size   = 710,730.54
                                                Design df         =        618
                                                F(  11,     608)  =      26.42
                                                Prob > F          =     0.0000

------------------------------------------------------------------------------
             |             Linearized
    smokcondw | Odds Ratio   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 _Ihadsacat_1 |   1.365408   .1613651     2.64   0.009     1.082603    1.722089
 _Ihadsacat_2 |   1.629866   .2456955     3.24   0.001      1.21223    2.191385
          age |    1.06081   .0056154    11.15   0.000     1.049839    1.071895
          sex |   .5675623   .0554162    -5.80   0.000     .4685328    .6875228
     _Iedu3_2 |    .781669   .0812576    -2.37   0.018     .6373286     .958699
     _Iedu3_3 |   .6706229   .0793047    -3.38   0.001     .5316451    .8459312
_IFRexercis_1 |   .9403825   .0999393    -0.58   0.563     .7632476    1.158627
_IFRexercis_2 |   .5816905    .065245    -4.83   0.000     .4666917    .7250264
      FRwaist |   1.009383    .003814     2.47   0.014     1.001921    1.016901
     BEHcage2 |   .8840232   .1306649    -0.83   0.405     .6613071    1.181746
     ph201_05 |   1.377217   .2101152     2.10   0.036     1.020667    1.858322
        _cons |   .0046641   .0028583    -8.76   0.000     .0013999    .0155391
------------------------------------------------------------------------------
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.


. xi: svy:logistic smokcondw i.hadsac age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmok
i.hadsacat        _Ihadsacat_0-2      (naturally coded; _Ihadsacat_0 omitted)
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,024
Number of PSUs     =       621                  Population size   = 710,730.54
                                                Design df         =        618
                                                F(  13,     606)  =      24.63
                                                Prob > F          =     0.0000

------------------------------------------------------------------------------
             |             Linearized
    smokcondw | Odds Ratio   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 _Ihadsacat_1 |   1.353942   .1619265     2.53   0.012     1.070533    1.712381
 _Ihadsacat_2 |   1.569477   .2384689     2.97   0.003     1.164577    2.115153
          age |   1.061901   .0056491    11.29   0.000     1.050865    1.073053
          sex |   .6160451   .0611649    -4.88   0.000     .5069137     .748671
     _Iedu3_2 |   .8065753   .0842846    -2.06   0.040      .656935    .9903014
     _Iedu3_3 |   .6975688   .0833439    -3.01   0.003     .5516809    .8820356
_IFRexercis_1 |   .9429412   .0998852    -0.55   0.579     .7658443    1.160991
_IFRexercis_2 |   .5847238   .0655394    -4.79   0.000     .4691975     .728695
      FRwaist |    1.00912   .0038057     2.41   0.016     1.001674    1.016621
     BEHcage2 |   .7991633    .119154    -1.50   0.133     .5963122     1.07102
     ph201_05 |   1.359485   .2120355     1.97   0.049     1.000816    1.846694
_IBEHsmoker_1 |   1.696681   .1609752     5.57   0.000     1.408259    2.044173
_IBEHsmoker_2 |   1.758777   .2348069     4.23   0.000     1.353155    2.285989
        _cons |   .0028551   .0017711    -9.44   0.000     .0008444    .0096536
------------------------------------------------------------------------------
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

```
. xi: svy:logistic smokcondw ph301_08 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  10,    609)   =      29.25
                                                Prob > F          =     0.0000

------------------------------------------------------------------------------
             |             Linearized
    smokcondw | Odds Ratio   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     ph301_08 |   2.233721   .6120081     2.93   0.003     1.304229    3.825637
          age |   1.059315   .0054559    11.19   0.000     1.048655    1.070084
          sex |   .6165045   .0596289    -5.00   0.000     .5098538    .7454642
     _Iedu3_2 |   .7686454    .077992    -2.59   0.010     .6297785    .9381325
     _Iedu3_3 |   .6412493   .0739961    -3.85   0.000     .5112237    .8043459
_IFRexercis_1 |    .934036   .0951677    -0.67   0.503     .7646552    1.140937
_IFRexercis_2 |   .5671102   .0624435    -5.15   0.000     .4568349    .7040048
      FRwaist |   1.008804   .0037295     2.37   0.018     1.001507    1.016155
     BEHcage2 |   .8717492   .1282382    -0.93   0.351     .6530258    1.163731
     ph201_05 |   1.378422    .210473     2.10   0.036     1.021306    1.860408
        _cons |   .0053888   .0032002    -8.80   0.000     .0016788    .0172975
------------------------------------------------------------------------------

Note: Variances scaled within each stage to handle strata with a single
      sampling unit.


. xi: svy:logistic smokcondw ph301_08 age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsmok
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  12,    607)   =      27.77
                                                Prob > F          =     0.0000

------------------------------------------------------------------------------
             |             Linearized
    smokcondw | Odds Ratio   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     ph301_08 |   2.064727   .5696788     2.63   0.009      1.20101    3.549592
          age |   1.060348    .00548    11.34   0.000     1.04964    1.071164
          sex |   .6715011   .0660054    -4.05   0.000     .5536221    .8144792
     _Iedu3_2 |   .7921703   .0809291    -2.28   0.023     .6481688    .9681642
     _Iedu3_3 |   .6655733   .0776344    -3.49   0.001     .5293153    .8369072
_IFRexercis_1 |    .937584   .0954633    -0.63   0.527     .7676658    1.145113
_IFRexercis_2 |   .5706542   .0628943    -5.09   0.000     .4595939    .7085522
      FRwaist |   1.008449   .0037159     2.28   0.023     1.001178    1.015772
     BEHcage2 |   .7914049    .116748    -1.59   0.113     .5923565    1.057339
     ph201_05 |   1.360076    .211288     1.98   0.048     1.002465    1.845257
_IBEHsmoker_1 |   1.754968   .1612936     6.12   0.000     1.465158    2.102103
_IBEHsmoker_2 |    1.74146   .2282002     4.23   0.000     1.346337    2.252545
        _cons |   .0032641   .0019648    -9.51   0.000     .0010009    .0106449
------------------------------------------------------------------------------

Note: Variances scaled within each stage to handle strata with a single
      sampling unit.


. xi: svy:logistic smokcondw SUorMHprob age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  10,    609)   =      28.32
                                                Prob > F          =     0.0000

------------------------------------------------------------------------------
             |             Linearized
    smokcondw | Odds Ratio   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   SUorMHprob |   1.352862   .1871792     2.18   0.029     1.030984    1.775232
          age |   1.059714    .005487    11.20   0.000     1.048993    1.070544
          sex |   .6013963    .057782    -5.29   0.000      .497986    .7262806
     _Iedu3_2 |   .7660956   .0775466    -2.63   0.009     .6279898    .9345732
     _Iedu3_3 |   .6352288   .0733146    -3.93   0.000     .5064032    .7968267
_IFRexercis_1 |   .9353498   .0949836    -0.66   0.511     .7662421    1.141779
_IFRexercis_2 |    .571175   .0628372    -5.09   0.000     .4601945    .7089195
      FRwaist |   1.008633    .003723     2.33   0.020     1.001348    1.015971
     BEHcage2 |   .8885526    .129375    -0.81   0.417     .6675801    1.182668
     ph201_05 |   1.368528   .2095017     2.05   0.041     1.013191    1.848485
        _cons |   .0054672   .0032594    -8.74   0.000     .0016956    .0176286
------------------------------------------------------------------------------

Note: Variances scaled within each stage to handle strata with a single
      sampling unit.


. xi: svy:logistic smokcondw SUorMHprob age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05 i.BEHsm
i.edu3            _Iedu3_1-3          (naturally coded; _Iedu3_1 omitted)
i.FRexercise3     _IFRexercis_0-2     (naturally coded; _IFRexercis_0 omitted)
i.BEHsmoker       _IBEHsmoker_0-2     (naturally coded; _IBEHsmoker_0 omitted)
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =        618
                                                F(  12,    607)   =      26.97
                                                Prob > F          =     0.0000

------------------------------------------------------------------------------
             |             Linearized
    smokcondw | Odds Ratio   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   SUorMHprob |   1.300407   .1781703     1.92   0.056     .9936333    1.701893
          age |   1.060717    .005504    11.36   0.000     1.049963    1.071581
          sex |    .656196   .0640918    -4.31   0.000     .5416667    .7949413
     _Iedu3_2 |   .7907759   .0806052    -2.30   0.022     .6473195    .9660246
     _Iedu3_3 |   .6605649   .0771472    -3.55   0.000     .5251808    .8308491
_IFRexercis_1 |   .9390585   .0953003    -0.62   0.536     .7693766    1.146163
_IFRexercis_2 |   .5743352   .0632493    -5.04   0.000     .4626388    .7129988
      FRwaist |   1.008297   .0037094     2.25   0.025     1.001039    1.015608
     BEHcage2 |   .8039634   .1178616    -1.49   0.137     .6028437     1.07218
     ph201_05 |   1.351368   .2104875     1.93   0.054     .9952477    1.834915
_IBEHsmoker_1 |   1.756687    .161172     6.14   0.000     1.467051    2.103504
_IBEHsmoker_2 |   1.751381     .22801     4.30   0.000      1.35627    2.261595
        _cons |   .0033034   .0019902    -9.48   0.000     .0010119    .0107843
------------------------------------------------------------------------------

Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

# Appendix D

# Interaction effects without High Cholesterol

```
. svy:logistic smokcondw anymh##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs      =       5,176
Number of PSUs     =       621                  Population size    = 735,169.58
                                                Design df          =         618
                                                F(  14,    605)    =       23.52
                                                Prob > F           =      0.0000
```

| smokcondw | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| anymhprob | | | | | | |
| Any emotional, nervous or psychiatric problems, such.. | 1.18834 | .3413512 | 0.60 | 0.548 | .6760094 | 2.088952 |
| BEHsmoker | | | | | | |
| Past | 1.795784 | .1734683 | 6.06 | 0.000 | 1.485487 | 2.170898 |
| Current | 1.674623 | .2382228 | 3.62 | 0.000 | 1.266462 | 2.214329 |
| anymhprob#BEHsmoker | | | | | | |
| Any emotional, nervous or psychiatric problems, such.. # Past | .7674927 | .2834624 | -0.72 | 0.474 | .3716023 | 1.585149 |
| Any emotional, nervous or psychiatric problems, such.. # Current | 1.448171 | .6200752 | 0.86 | 0.387 | .6246529 | 3.357383 |
| age | 1.060376 | .0055226 | 11.26 | 0.000 | 1.049586 | 1.071277 |
| sex | .6578597 | .0641915 | -4.29 | 0.000 | .5431418 | .7968072 |
| edu3 | | | | | | |
| Secondary | .7915038 | .0807963 | -2.29 | 0.022 | .6477274 | .9671942 |
| Third/higher | .6644617 | .0775516 | -3.50 | 0.000 | .528358 | .8356253 |
| FRexercise3 | | | | | | |
| 1 | .9364541 | .0953085 | -0.65 | 0.519 | .7668045 | 1.143637 |
| 2 | .573695 | .0632279 | -5.04 | 0.000 | .4620453 | .7123239 |
| FRwaist | 1.008518 | .0037018 | 2.31 | 0.021 | 1.001274 | 1.015814 |
| BEHcage2 | .8067435 | .1183252 | -1.46 | 0.144 | .6048458 | 1.076035 |
| ph201_05 | 1.364672 | .2123312 | 2.00 | 0.046 | 1.005377 | 1.85237 |
| _cons | .0033144 | .0019917 | -9.50 | 0.000 | .0010183 | .0107876 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. svy:logistic smokcondw SRpsych##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs      =       5,176
Number of PSUs     =       621                  Population size    = 735,169.58
                                                Design df          =         618
                                                F(  14,    605)    =       23.40
                                                Prob > F           =      0.0000
```

| smokcondw | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| 1.SRpsychmeduse | 1.157096 | .2947086 | 0.57 | 0.567 | .7016907 | 1.908065 |
| BEHsmoker | | | | | | |
| Past | 1.711713 | .1653646 | 5.56 | 0.000 | 1.415915 | 2.069307 |
| Current | 1.615377 | .2374722 | 3.26 | 0.001 | 1.210307 | 2.156017 |
| SRpsychmeduse#BEHsmoker | | | | | | |
| 1#Past | 1.278069 | .4094863 | 0.77 | 0.444 | .6812381 | 2.397783 |
| 1#Current | 1.648508 | .6345066 | 1.30 | 0.195 | .7741456 | 3.510422 |
| age | 1.059847 | .0054565 | 11.29 | 0.000 | 1.049186 | 1.070617 |
| sex | .6465358 | .0633954 | -4.45 | 0.000 | .5332922 | .7838266 |
| edu3 | | | | | | |
| Secondary | .8022392 | .0826634 | -2.14 | 0.033 | .6552745 | .9821651 |
| Third/higher | .674168 | .0792226 | -3.36 | 0.001 | .5352365 | .8491619 |
| FRexercise3 | | | | | | |
| 1 | .9502328 | .0967789 | -0.50 | 0.616 | .7779775 | 1.160628 |
| 2 | .5804056 | .0640517 | -4.93 | 0.000 | .4673169 | .7208613 |
| FRwaist | 1.008169 | .0037199 | 2.21 | 0.028 | 1.00089 | 1.015501 |
| BEHcage2 | .8090678 | .1178659 | -1.45 | 0.146 | .6077677 | 1.077041 |
| ph201_05 | 1.325562 | .2058405 | 1.81 | 0.070 | .9771501 | 1.798202 |
| _cons | .0035896 | .0021633 | -9.34 | 0.000 | .0010991 | .0117229 |

Note: Variances scaled within each stage to handle strata with a single sampling unit.

```
. svy:logistic smokcondw SRmed_pr##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =       5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =         618
                                                F(  14,    605)   =       22.90
                                                Prob > F          =      0.0000
```

| smokcondw | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| 1.SRmed_prob | .4143275 | .2231586 | -1.64 | 0.102 | .1438744 | 1.193175 |
| BEHsmoker | | | | | | |
| Past | 1.711965 | .1611716 | 5.71 | 0.000 | 1.42299 | 2.059623 |
| Current | 1.704207 | .2305622 | 3.94 | 0.000 | 1.306584 | 2.222836 |
| SRmed_prob#BEHsmoker | | | | | | |
| 1#Past | 2.788676 | 1.757905 | 1.63 | 0.104 | .8086695 | 9.616676 |
| 1#Current | 3.459546 | 2.374841 | 1.81 | 0.071 | .8985793 | 13.31931 |
| age | 1.060509 | .0055068 | 11.31 | 0.000 | 1.04975 | 1.071379 |
| sex | .6600092 | .0647436 | -4.24 | 0.000 | .5443617 | .8002257 |
| edu3 | | | | | | |
| Secondary | .7919887 | .0808575 | -2.28 | 0.023 | .6481055 | .9678149 |
| Third/higher | .6654237 | .0777342 | -3.49 | 0.001 | .5290133 | .8370088 |
| FRexercise3 | | | | | | |
| 1 | .9395112 | .0955518 | -0.61 | 0.540 | .7694169 | 1.147208 |
| 2 | .5711605 | .0629027 | -5.09 | 0.000 | .4600766 | .7090652 |
| FRwaist | 1.008486 | .0037158 | 2.29 | 0.022 | 1.001215 | 1.01581 |
| BEHcage2 | .8251179 | .1202514 | -1.32 | 0.188 | .6197547 | 1.098531 |
| ph201_05 | 1.350999 | .2110519 | 1.93 | 0.055 | .994077 | 1.836073 |
| _cons | .0033901 | .0020338 | -9.48 | 0.000 | .0010436 | .0110121 |

```
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.


. svy:logistic smokcondw SRmedORpro##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =       5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =         618
                                                F(  14,    605)   =       24.08
                                                Prob > F          =      0.0000
```

| smokcondw | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| 1.SRmedORprob | 1.472727 | .3050825 | 1.87 | 0.062 | .9804957 | 2.212069 |
| BEHsmoker | | | | | | |
| Past | 1.801313 | .1788483 | 5.93 | 0.000 | 1.482209 | 2.189117 |
| Current | 1.571302 | .2447424 | 2.90 | 0.004 | 1.157226 | 2.133541 |
| SRmedORprob#BEHsmoker | | | | | | |
| 1#Past | .8330579 | .2253659 | -0.68 | 0.500 | .4897214 | 1.417103 |
| 1#Current | 1.411644 | .4675189 | 1.04 | 0.298 | .7366562 | 2.705115 |
| age | 1.060349 | .0054924 | 11.31 | 0.000 | 1.049617 | 1.07119 |
| sex | .644594 | .0631507 | -4.48 | 0.000 | .5317783 | .7813432 |
| edu3 | | | | | | |
| Secondary | .8050038 | .082776 | -2.11 | 0.035 | .6578089 | .9851357 |
| Third/higher | .672192 | .0787211 | -3.39 | 0.001 | .5340878 | .8460073 |
| FRexercise3 | | | | | | |
| 1 | .9511481 | .0973017 | -0.49 | 0.625 | .7780367 | 1.162777 |
| 2 | .5847472 | .0648894 | -4.84 | 0.000 | .4702459 | .7271288 |
| FRwaist | 1.008525 | .0037168 | 2.30 | 0.022 | 1.001252 | 1.01585 |
| BEHcage2 | .7936025 | .1155667 | -1.59 | 0.113 | .5962184 | 1.056333 |
| ph201_05 | 1.324806 | .2054783 | 1.81 | 0.070 | .976948 | 1.796526 |
| _cons | .0032417 | .0019559 | -9.50 | 0.000 | .0009912 | .0106015 |

```
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

```
. svy:logistic smokcondw ph301_08##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =       5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =         618
                                                F(  14,    605)   =       24.28
                                                Prob > F          =      0.0000
```

| smokcondw | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| ph301_08 | | | | | | |
| Alcohal or substance abuse | .9953103 | 1.059573 | -0.00 | 0.996 | .1230327 | 8.051866 |
| BEHsmoker | | | | | | |
| Past | 1.746209 | .1612341 | 6.04 | 0.000 | 1.456623 | 2.093366 |
| Current | 1.712074 | .23467 | 3.92 | 0.000 | 1.308041 | 2.240906 |
| ph301_08#BEHsmoker | | | | | | |
| Alcohal or substance abuse#Past | 2.054481 | 2.171275 | 0.68 | 0.496 | .2578374 | 16.37037 |
| Alcohal or substance abuse#Current | 2.526982 | 2.914865 | 0.80 | 0.422 | .2623114 | 24.34372 |
| age | 1.06036 | .0054898 | 11.32 | 0.000 | 1.049633 | 1.071196 |
| sex | .6725472 | .0661322 | -4.03 | 0.000 | .5544458 | .8158052 |
| edu3 | | | | | | |
| Secondary | .7928453 | .0809493 | -2.27 | 0.023 | .6487994 | .9688722 |
| Third/higher | .6671965 | .077867 | -3.47 | 0.001 | .5305387 | .8390551 |
| FRexercise3 | | | | | | |
| 1 | .9378614 | .095481 | -0.63 | 0.529 | .7679099 | 1.145426 |
| 2 | .5725097 | .0632547 | -5.05 | 0.000 | .4608419 | .7112361 |
| FRwaist | 1.008465 | .0037195 | 2.29 | 0.023 | 1.001187 | 1.015796 |
| BEHcage2 | .794065 | .1184894 | -1.55 | 0.123 | .592368 | 1.064438 |
| ph201_05 | 1.362223 | .2117084 | 1.99 | 0.047 | 1.003922 | 1.848402 |
| _cons | .0032586 | .0019619 | -9.51 | 0.000 | .0009989 | .0106299 |

Note: Variances scaled within each stage to handle strata with a single
      sampling unit.

```
. svy:logistic smokcondw SUorMHprob##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =       5,176
Number of PSUs     =       621                  Population size   = 735,169.58
                                                Design df         =         618
                                                F(  14,    605)   =       23.77
                                                Prob > F          =      0.0000
```

| smokcondw | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| 1.SUorMHprob | 1.208155 | .3381078 | 0.68 | 0.499 | .6973362 | 2.093162 |
| BEHsmoker | | | | | | |
| Past | 1.785904 | .1733871 | 5.97 | 0.000 | 1.475896 | 2.161028 |
| Current | 1.611281 | .2374574 | 3.24 | 0.001 | 1.206374 | 2.152091 |
| SUorMHprob#BEHsmoker | | | | | | |
| 1#Past | .8568521 | .2941629 | -0.45 | 0.653 | .4366258 | 1.681521 |
| 1#Current | 1.64961 | .66553 | 1.24 | 0.215 | .7469519 | 3.643089 |
| age | 1.060493 | .0055244 | 11.27 | 0.000 | 1.049699 | 1.071398 |
| sex | .6588418 | .0644744 | -4.26 | 0.000 | .5436494 | .798442 |
| edu3 | | | | | | |
| Secondary | .7921048 | .0807876 | -2.29 | 0.023 | .6483318 | .9677607 |
| Third/higher | .6628534 | .0773579 | -3.52 | 0.000 | .5270886 | .8335879 |
| FRexercise3 | | | | | | |
| 1 | .936184 | .0951911 | -0.65 | 0.517 | .7667279 | 1.143092 |
| 2 | .5755076 | .0633903 | -5.02 | 0.000 | .4635643 | .7144834 |
| FRwaist | 1.00849 | .0037048 | 2.30 | 0.022 | 1.001241 | 1.015792 |
| BEHcage2 | .7889383 | .1170974 | -1.60 | 0.111 | .5894628 | 1.055917 |
| ph201_05 | 1.360917 | .2120385 | 1.98 | 0.048 | 1.002189 | 1.848051 |
| _cons | .0032868 | .0019757 | -9.51 | 0.000 | .0010095 | .0107015 |

Note: Variances scaled within each stage to handle strata with a single
      sampling unit.

```
. svy:logistic smokcondw i.MHdep3##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,114
Number of PSUs     =       621                  Population size   = 726,602.54
                                                Design df         =        618
                                                F(  17,    602)   =      19.96
                                                Prob > F          =     0.0000
```

| smokcondw | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| MHdep3 | | | | | | |
| Moderate | 1.347004 | .227378 | 1.76 | 0.078 | .9669453 | 1.876446 |
| Severe | 2.52346 | .5265525 | 4.44 | 0.000 | 1.675073 | 3.801537 |
| BEHsmoker | | | | | | |
| Past | 2.095327 | .2589793 | 5.98 | 0.000 | 1.643759 | 2.670948 |
| Current | 1.639725 | .3091302 | 2.62 | 0.009 | 1.132355 | 2.374429 |
| MHdep3#BEHsmoker | | | | | | |
| Moderate#Past | .6724858 | .152784 | -1.75 | 0.081 | .430444 | 1.050629 |
| Moderate#Current | .9459938 | .3088275 | -0.17 | 0.865 | .498266 | 1.796037 |
| Severe#Past | .6629638 | .1819958 | -1.50 | 0.135 | .3866881 | 1.136629 |
| Severe#Current | 1.031504 | .3487786 | 0.09 | 0.927 | .5309975 | 2.003777 |
| age | 1.062297 | .0056038 | 11.46 | 0.000 | 1.051349 | 1.073359 |
| sex | .6280318 | .062343 | -4.69 | 0.000 | .5167963 | .7632096 |
| edu3 | | | | | | |
| Secondary | .8256692 | .0855002 | -1.85 | 0.065 | .6737348 | 1.011867 |
| Third/higher | .701099 | .0828703 | -3.00 | 0.003 | .5558652 | .884279 |
| FRexercise3 | | | | | | |
| 1 | .9779646 | .1010704 | -0.22 | 0.829 | .7983269 | 1.198024 |
| 2 | .6002374 | .0676473 | -4.53 | 0.000 | .4810649 | .7489322 |
| FRwaist | 1.008736 | .003707 | 2.37 | 0.018 | 1.001482 | 1.016042 |
| BEHcage2 | .7895982 | .1149902 | -1.62 | 0.105 | .5932002 | 1.05102 |
| ph201_05 | 1.345637 | .2087432 | 1.91 | 0.056 | .9922601 | 1.824864 |
| _cons | .0024089 | .0014643 | -9.92 | 0.000 | .0007301 | .0079481 |

```
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```

```
. svy:logistic smokcondw i.hadsac##BEHsmoker age sex i.edu3 i.FRexercise3 FRwaist BEHcage2 ph201_05
(running logistic on estimation sample)

Survey: Logistic regression

Number of strata   =         3                  Number of obs     =      5,024
Number of PSUs     =       621                  Population size   = 710,730.54
                                                Design df         =        618
                                                F(  17,    602)   =      18.91
                                                Prob > F          =     0.0000
```

| smokcondw | Odds Ratio | Linearized Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| hadsacat | | | | | | |
| Possible | 1.317244 | .2634739 | 1.38 | 0.169 | .8893557 | 1.950998 |
| Probable | 1.332097 | .3768328 | 1.01 | 0.311 | .76431 | 2.321679 |
| BEHsmoker | | | | | | |
| Past | 1.654075 | .1921409 | 4.33 | 0.000 | 1.31669 | 2.077909 |
| Current | 1.69555 | .2750631 | 3.25 | 0.001 | 1.232969 | 2.33168 |
| hadsacat#BEHsmoker | | | | | | |
| Possible#Past | .9699241 | .2561216 | -0.12 | 0.908 | .5774647 | 1.629109 |
| Possible#Current | 1.24606 | .4097401 | 0.67 | 0.504 | .6532663 | 2.376772 |
| Probable#Past | 1.423975 | .4938191 | 1.02 | 0.309 | .7206683 | 2.813643 |
| Probable#Current | 1.057703 | .4314164 | 0.14 | 0.891 | .4747815 | 2.356316 |
| age | 1.062279 | .0056919 | 11.28 | 0.000 | 1.05116 | 1.073516 |
| sex | .6142284 | .061035 | -4.90 | 0.000 | .5053372 | .7465838 |
| edu3 | | | | | | |
| Secondary | .8078935 | .0843724 | -2.04 | 0.042 | .6580886 | .9917994 |
| Third/higher | .7014106 | .0840469 | -2.96 | 0.003 | .5543404 | .8874996 |
| FRexercise3 | | | | | | |
| 1 | .941137 | .0998673 | -0.57 | 0.568 | .7641025 | 1.159188 |
| 2 | .5846041 | .0654781 | -4.79 | 0.000 | .4691769 | .7284288 |
| FRwaist | 1.009068 | .0038156 | 2.39 | 0.017 | 1.001603 | 1.016589 |
| BEHcage2 | .798744 | .1190714 | -1.51 | 0.132 | .5960287 | 1.070405 |
| ph201_05 | 1.364827 | .2128564 | 1.99 | 0.047 | 1.004766 | 1.853917 |
| _cons | .00286 | .0017842 | -9.39 | 0.000 | .00084 | .0097372 |

```
Note: Variances scaled within each stage to handle strata with a single
      sampling unit.
```